

Hydrogeological Study

Allen Park Clay Mine

Allen Park, Michigan



Professional Service Industries, Inc.
Michigan Testing Engineers Division



Professional Service Industries, Inc.
Michigan Testing Engineers Division

November 24, 1981

Wayne Disposal, Inc.
P.O. Box 5187
Dearborn, MI 48128

Attn: Mr. Walter W. Tomin, P.E.

Subject: Hydrogeological Study
Allen Park Clay Mine
Allen Park, Michigan
MTE File No. 406-15046

Gentlemen:

Attached please find ten copies of our hydrogeological report for the Allen Park Clay Mine Landfill study located in Wayne County, Michigan.

This report has been prepared for inclusion with Ford Motor Company's application for a hazardous waste disposal facility operating license as required by the Hazardous Waste Management Act 1979, P.A. 64.

If you should have any questions regarding this project, feel free to contact us.

Very truly yours,

MICHIGAN TESTING ENGINEERS, INC.

Marshall P. Austin, P.E.
Project Engineer

Randall DeRuiter
Branch Manager

Stephen C. Schleede, P.E.
Chief Soils Engineer

MICHIGAN TESTING ENGINEERS, INC.

HYDROGEOLOGICAL STUDY

ALLEN PARK CLAY MINE

ALLEN PARK, MICHIGAN

WAYNE DISPOSAL, INC.

P.O. Box 5187

DEARBORN, MICHIGAN 48128

NOVEMBER 24, 1981

BY

MICHIGAN TESTING ENGINEERS, INC.

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INTRODUCTION

General

This report presents the results and recommendations regarding the hydrogeological conditions at the Allen Park Clay Mine landfill site located in Wayne County, within the city limits of Allen Park, Michigan. The report has been prepared as required by the Michigan Department of Natural Resources in compliance with the Hazardous Waste Management Act 1979, P.A. 64 for inclusion with the application for hazardous waste disposal facility operating license.

Authorization to perform this exploration and analysis was in the form of a letter agreement dated July 29, 1981 from Wayne Disposal, Inc. (operators of Allen Park Clay Mine) to Michigan Testing Engineers, Inc.

Purpose

The purpose of the hydrogeological study was to determine the existing hydrogeological conditions; evaluate the potential for degradation of the ground and surface waters; and provide the basis for an effective and acceptable monitoring program.

Scope

The scope of work for our services regarding this project included:

1. Installation of five monitoring wells into the water bearing aquifer at or near the hardpan soils approximately 75 to 85 feet below the existing grade. The wells are to be used for sampling the groundwater and for studying the groundwater flow regime.
2. Securing soil samples (split spoon sampling in sands, shelly tubes in clays) during the well installation at intervals of; ten feet to the proposed trench bottom, every five feet for the next fifteen feet; then every 10 feet to the bottom of the boring. Laboratory tests performed on selected samples included: permeability determination, moisture contents, grain-size analysis (sieve and hydrometer) and Atterberg limits determination.

3. Obtain background information including: previous site studies, deep oil, water and gas wells, and existing hydrological information.
4. Determine subsurface soils and bedrock, their distribution, thickness and characteristics from field investigations (both past and present), other deep well logs and available geologic literature.
5. Determine hydrogeological conditions at the project area from available domestic well logs, previous hydrogeological reports and from current hydrogeological information obtained during this study. Determine surface drainage features and subsurface ground water flow from monitoring/observation wells and establish a subsurface ground water contour map.
6. Prepare a hydrogeological report including the above information and our recommendations for a ground water monitoring program.

Previous Explorations

Prior to this report, Michigan Testing Engineers, Inc. has conducted other subsurface explorations at this site. The results of these investigations were presented under MTE File Numbers 64-8519, 64-9623, 406-05042 and 401-00115. Pertinent information from each of these reports has been appended. A brief summary of each report follows.

File #64-8519 - Drilling of ten borings to depths ranging from 55.5 to 81 feet below the existing ground surface. Observation/monitoring wells were installed in four of the ten borings made. Laboratory testing consisted of classification and permeability determination of selected soil samples and chemical analysis of selected water samples.

File #64-9623 - Permeability tests were conducted on remolded, on-site silty clay samples to determine their suitability as a landfill cover (capping) material.

File #406-05042 - Installation of three, shallow groundwater observation wells.

File #401-00115 - Permeability tests were conducted using remolded, on-site bulk clay material used for construction of the perimeter dike.

DESCRIPTION OF SITE

Site Location

The Allen Park Clay Mine is bounded by Oakwood Boulevard, Interstate 94, Outer Drive, Snow Road and M-39 (Southfield Road). The site is located in Wayne County, within the city limits of Allen Park, Michigan (See Figures 1 and 2).

Existing Conditions

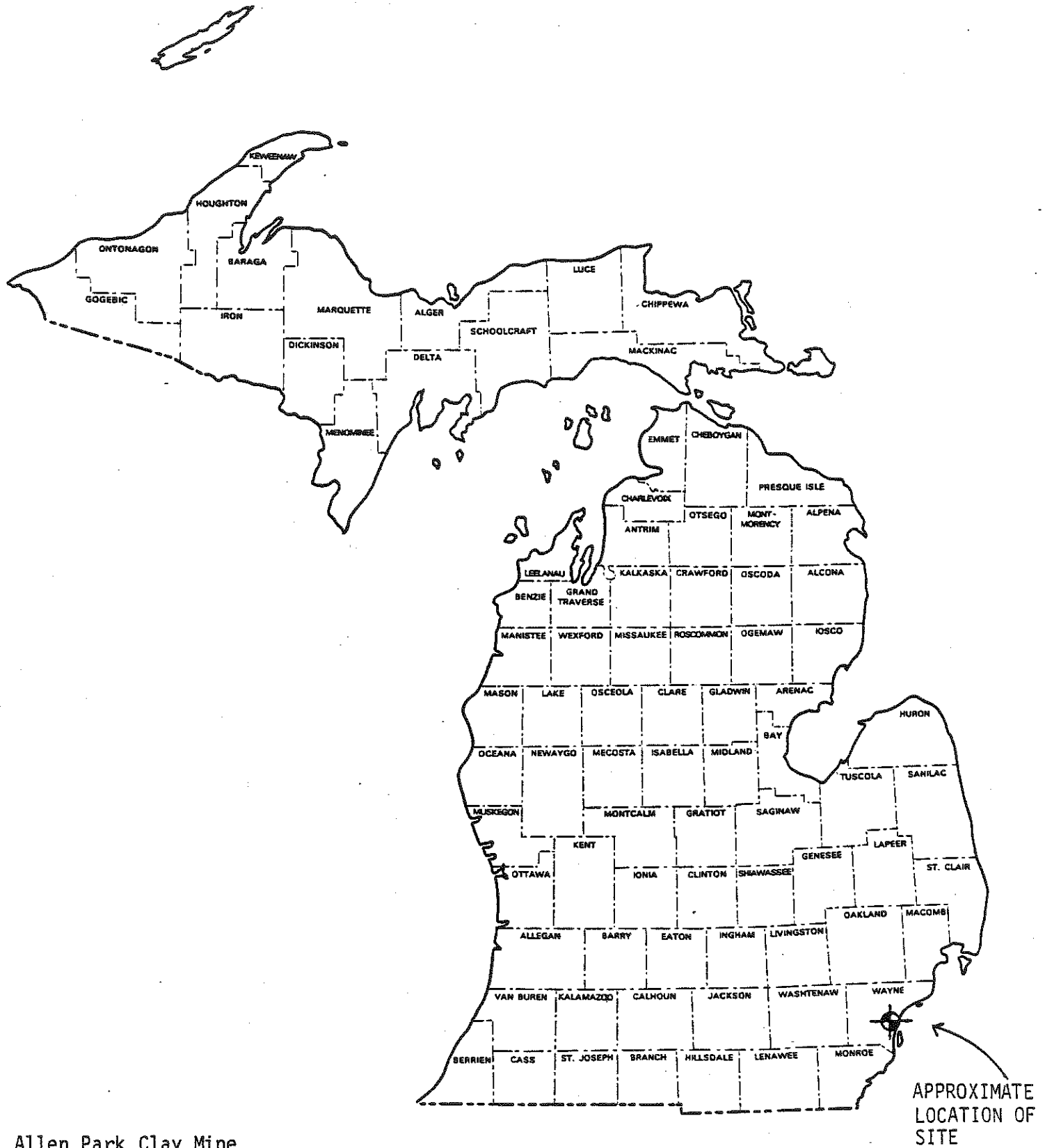
The Allen Park Clay Mine began operations in 1956. The 233 acre site is owned and operated by Ford Motor Company and presently is accepting only waste material from Ford Motor Company operations. A small portion of these wastes are classified as hazardous. It is planned to obtain an operating license for acceptance of hazardous wastes for a 16½ acre parcel within the site boundary. The limits of this area are shown on Figure 3. The types of classified hazardous waste to be disposed of include: Emission Control dust/sludge from the primary production of steel in electric furnaces (U.A. EPA Hazardous Waste No. K061) and Decanter tank tar sludge from coking operations (Hazardous Waste No. K087). Currently, only Cell No. 1 within the proposed licensing limits is accepting classified hazardous waste. The design elevation of the bottom of this cell is approximately +550 (USGS), or about 45 feet below grade.

Construction of a clay dike around the perimeter of the site is presently near completion.

Site Drainage

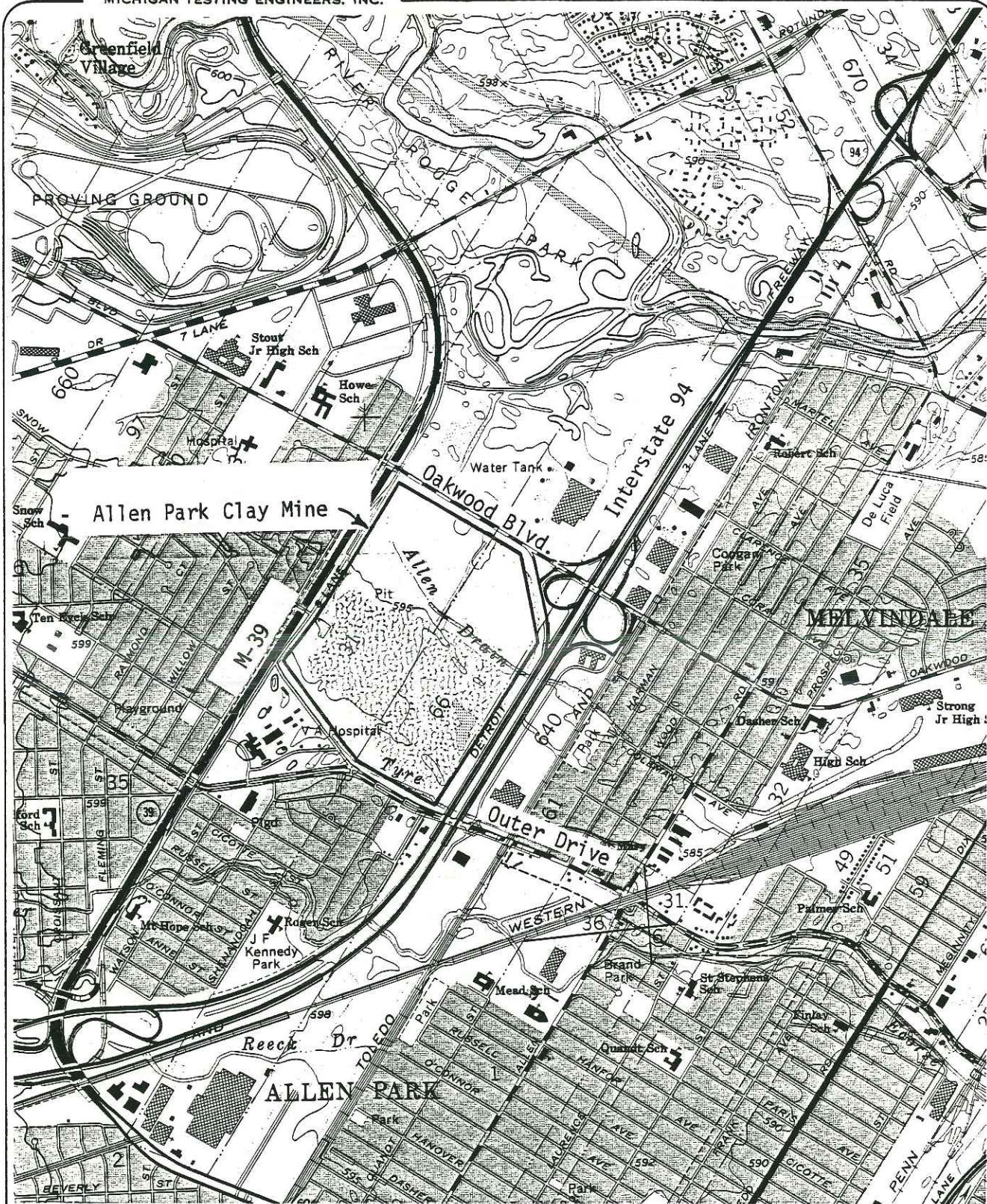
To facilitate removal of surface runoff at the site, a shallow ditch has been excavated partially around the outside of

SITE LOCATION



Allen Park Clay Mine
Hydrogeological Study
406-15046

Figure 1



0 1000 2000 3000 4000 5000

Scale - Feet
Contour Interval 5 Feet
Datum is Mean Sea Level

Allen Park Clay Mine
Disposal Landfill
Allen Park, Michigan
Wayne County

Figure 2

NOTES:

1. General Layout Of Site Facilities From Drawing Supplied By Wayne Disposal, Inc., Entitled "Allen Park Clay Mine" Dated 9-12-79, Rev. 5-1-81, Sheet No. C-2 of Drawing No. 79P - 23.6.
2. Location And Elevation of Bench Marks Obtained From Charles E. Raines Company

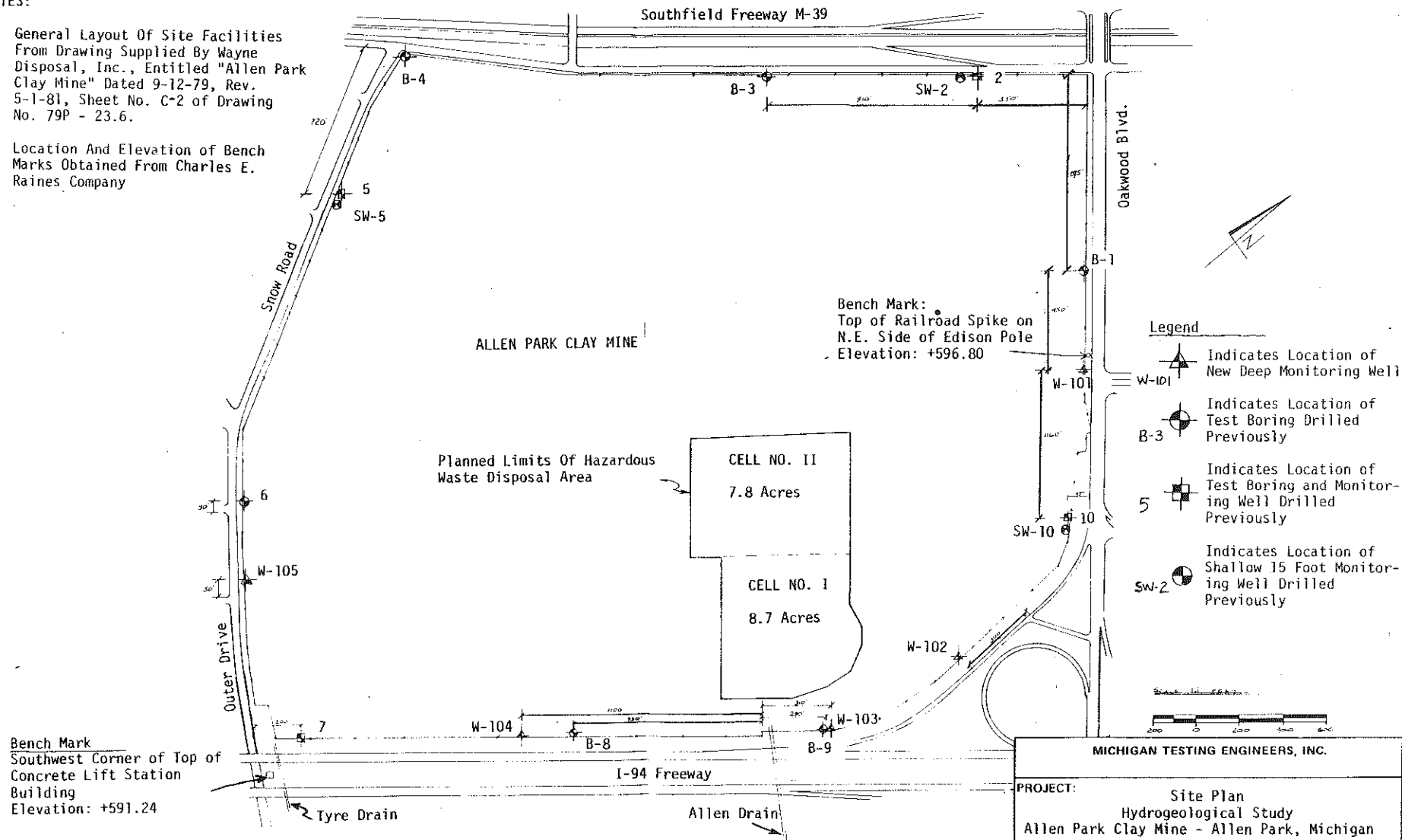


Figure 3

the perimeter dike beginning along the Southfield Freeway (M-39) traveling northeast to Oakwood outside the clay dike, then southeast along Oakwood around to I-94 where it empties into a temporary settling pond near Monitor Well W-103 before emptying into the Allen Drain, located approximately 250 feet southwest of Monitor Well W-103.

In addition, runoff from non-hazardous areas from within the facility are collected by ditches which empty into the perimeter ditch described above. A portion of the precipitation which collects in Cell No. 1 (where classified hazardous wastes are stored) will be used for dust control within this cell and any excess runoff will be hauled by tankers to the Ford Motor Company Rouge Plant. (Presently, Cell No. 2 contains no waste and runoff will be periodically pumped to the perimeter drainage ditch.)

The Tyre Drain collects runoff along Snow Road and Outer Drive as it travels to south to southeast direction towards I-94.

Both drains are enclosed as they travel southeast under I-94. The Tyre Drain empties into the Allen Drain which eventually empties into the Rouge River. A drainage map obtained from the office of the Wayne County Drain Commissioner is found on Figure 4.

From discussions with the Water Management Division of the Michigan Department of Natural Resources and others, it was learned that no portion of the site is contained within the limits of the 100 year flood plain of either the Rouge or Ecorse Rivers.

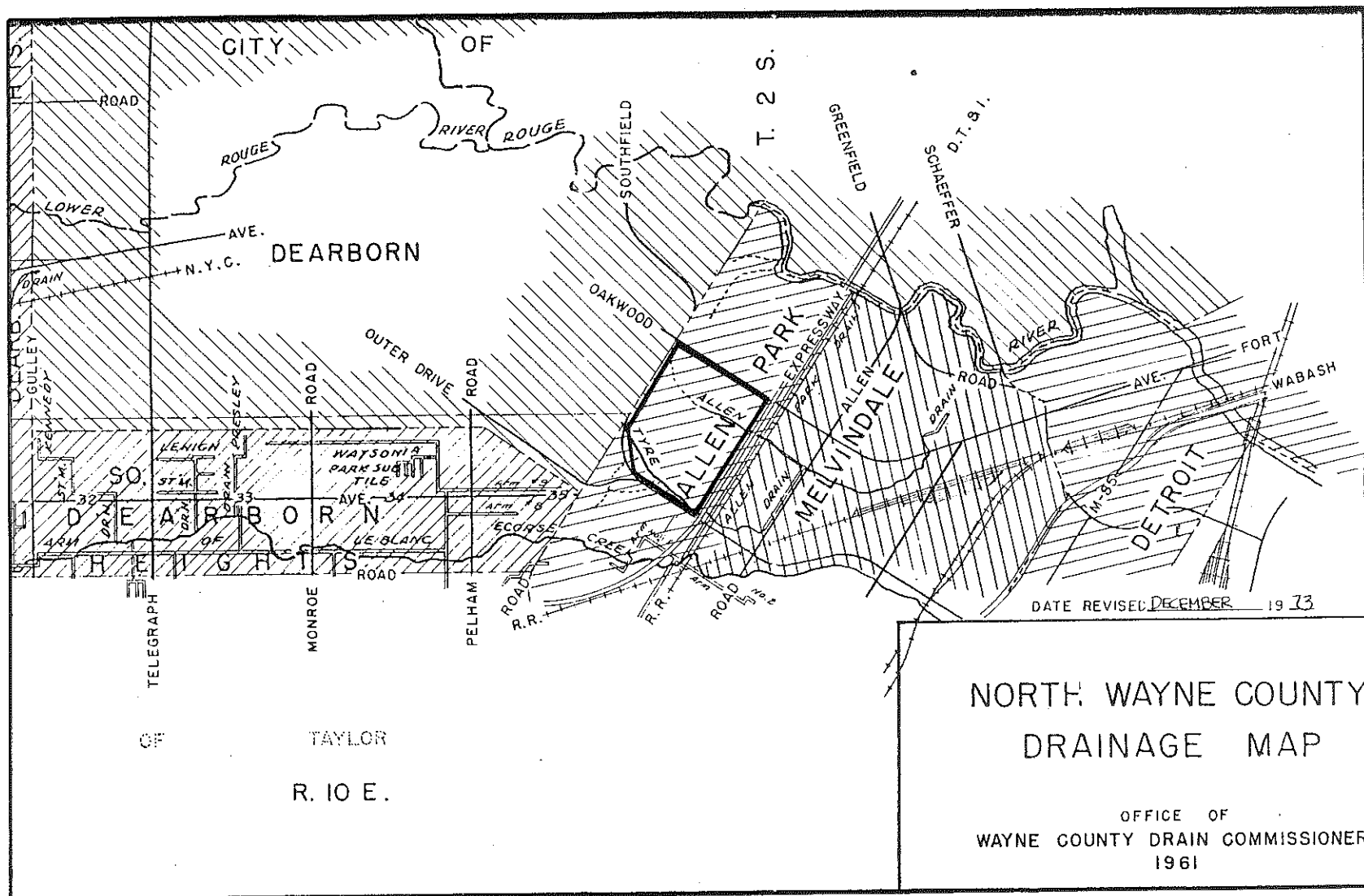


Figure 4

FIELD EXPLORATION

Scope

The field exploration to determine the engineering characteristics of the subsurface materials, included a reconnaissance of the project site, making the borings, performing standard penetration tests and recovering both split and undisturbed shelby tube samples.

Five soil test borings have been made, and these were drilled to depths ranging from 80 feet to 93 feet below the existing ground surface. They were drilled in the locations determined during a meeting with Wayne Disposal, Inc., the Michigan Department of Natural Resources and Michigan Testing Engineers, Inc.

The borings were located by means of normal taping procedures and are presumed to be accurate to within a few feet. Boring locations are shown on Figure 3. After completion of the borings, five PVC monitor/observation wells were installed in the bore holes. The installation procedure is described in a later section.

Drilling and Sampling Procedures

The soil borings were performed with a drilling rig equipped with a rotary head. Conventional hollow-stem augers were used to advance the holes. Split spoon samples were obtained in conjunction with performing the standard penetration test in accordance with A.S.T.M. Procedure D-1586. Undisturbed samples were obtained using thin-walled sampling procedures in accordance with ASTM D-1587. Samples were identified according to boring number and depth and transported to the laboratory in special containers to protect against moisture loss.

Field Tests and Measurements

Penetration Tests - During the split spoon sampling procedure,

standard penetration tests were performed to obtain the standard penetration value of the soil. The standard penetration value (N) is defined as the number of blows of a 140 pound hammer falling 30 inches, required to advance the split-spoon sampler one foot into the soil. The sampler is lowered to the bottom of the drill hole, and the number of blows recorded for each of three successive increments of six inches penetration. (These three values are reported on the boring logs). The results of the standard penetration tests indicate the relative density and comparative consistency of the soils, and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components.

Ground Surface Elevations - Elevations of the ground surface and monitor wells shown on the boring logs were determined by field engineers using conventional leveling techniques and is presumably accurate to within ± 0.01 feet.

Bench Marks

The elevation of the ground surface and top of monitor wells at W-101, W-102 and W-103 are referenced to the top of the railroad spike set in the northeast side of the Edison pole located approximately 200 feet west of the Oakwood entrance to the Allen Park Clay Mine on the south side of Oakwood Boulevard. The elevation of this bench mark was given as +596.80 (USGS).

Monitor wells and ground surface elevations at W-104 and W-105 are referenced to the bench mark established at the southwest corner of the top of the concrete lift station building between the east and west bound lanes of I-94 on the north side of Outer Drive.

The elevation of this bench mark was given at +591.24 (USGS).

Elevations of these bench marks were provided by others and their locations are shown on Figure 3.

MONITORING/OBSERVATION WELL INSTALLATION PROCEDURE

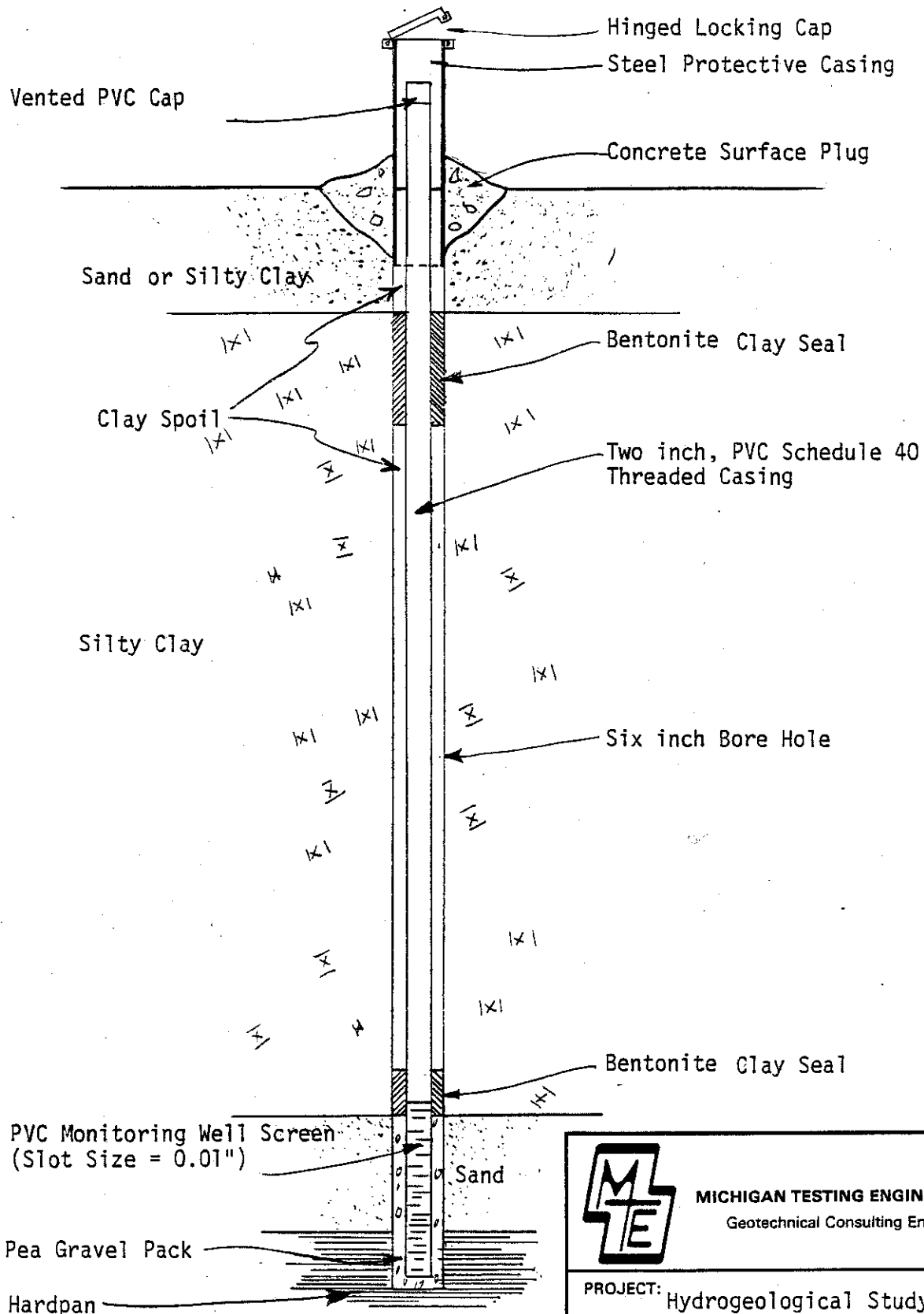
The monitoring wells were constructed using 2-inch, threaded, schedule 40 PVC pipe. Upon completion of the soil boring, a five foot slotted PVC well screen (slot size - 0.01 inch) was attached to the bottom of the PVC standpipe and lowered to the bottom of the borehole within the sand and hardpan layers. A pea gravel pack was constructed around the entire length of the screen and a bentonite seal (approximately 2 feet thick) placed over the gravel pack within the borehole to prevent seepage from above.

The borehole was then backfilled with the clay spoil from the boring operation to the surface with a two-foot bentonite seal placed at a depth of approximately 15 feet. Five-inch diameter steel casing was placed over the standpipe and grouted in place to a depth of about four feet below grade to protect the PVC standpipe. Due to the artesian water conditions from the deep aquifer, the well and steel casing are approximately 10 feet above the existing grade. Locking caps were provided to reduce the potential for vandalism. A typical cross section of the well construction is shown on Figure 5.

Upon completion of the well installation, the wells were developed by flushing (with clean water) any soil fines or other foreign material from within the well casing. Subsequently, the well casing, ground surface and ground water elevations were determined at each well and are shown on Table 1. Upon development of Well No. W-102, it was discovered that the well was (and presently, still is) flowing and, therefore, to properly determine the ground water elevation, a piece of PVC casing (approximately 3 feet in length) must be coupled to the existing casing to permit the water level to stabilize. The extension

should be left in place approximately one week prior to obtaining a reading, to account for hydraulic lag.

TYPICAL WELL CONSTRUCTION



MICHIGAN TESTING ENGINEERS, INC.
Geotechnical Consulting Engineers

PROJECT: Hydrogeological Study
Allen Park Clay Mine

Job: 406-15046

Date: Aug. 1981

ALLEN PARK CLAY MINE

MONITOR WELL - WATER LEVEL READINGS

| Well Number | Ground Elevation, Ft. | Well Elevation ⁽¹⁾ USGS | Ground Water ⁽²⁾ Elevation 11-4-81 | Ground Water ⁽³⁾ Elevation 5-29-81 | Ground Water ⁽³⁾ Elevation 3-26-81 |
|-------------|-----------------------|---------------------------------------|---|---|---|
| 2 | 595.1 | 600.76 | 600.67 | 600.44 | 600.21 |
| 5 | 595.7 | 605.92 | 605.09 | 604.62 | 604.49 |
| 7 | 594.1 | 597.35 | 591.01 | 593.23 | 594.14 |
| 10 | 593.4 | 603.03 | 601.81 | 601.93 | 601.56 |
| W-101 | 593.9 | 601.47 | 601.21 | | |
| W-102 | 591.3 | 600.81 | 603.22 ⁽⁴⁾ | | |
| W-103 | 593.9 | 605.06 | 603.52 | | |
| W-104 | 594.1 | 603.82 | 603.81 | | |
| W-105 | 594.5 | 604.08 | 603.86 | | |

(1) Well Elevation is recorded as top of standpipe.

(2) Data Recorded by Michigan Testing Engineers, Inc.

(3) Data obtained from Michigan Department of Natural Resources.

(4) Well extended temporarily to obtain water level.

TABLE 1

LABORATORY TESTING PROGRAM

The laboratory testing program included supplementary visual classification, and water content determinations on all samples. Selected samples were subjected to dry unit weight determination, Atterberg limit tests (ASTM D-423 and D-424), grain size analyses (ASTM D-422) and permeability determination.

All phases of the laboratory testing program were conducted in general accordance with applicable ASTM Specifications, and the results of these tests are found on the accompanying boring logs and/or on Table 2 which follows.

Allen Park Clay Mine
Allen Park, Michigan

SOIL CLASSIFICATION SUMMARY

| Boring Number | Sample Depth, Ft. | Moisture Content, % | Atterberg Limits | | | Permeability cm/sec | USC* Classification |
|------------------|----------------------|------------------------|------------------|----|----|------------------------|------------------------|
| | | | LL | PL | PI | | |
| W-101 | 15 | 22.3 | 24 | 16 | 8 | 3.8×10^{-8} | CL |
| | 20 | 33.4 | 36 | 17 | 19 | 3.5×10^{-8} | CL |
| | 30 | 19.3 | 27 | 16 | 11 | - | CL |
| | 35 | 19.3 | 29 | 15 | 14 | 2.3×10^{-8} | CL |
| | 40 | 16.6 | 21 | 14 | 7 | - | CL-ML |
| | 45 | 20.1 | 30 | 16 | 14 | 2.1×10^{-8} | CL |
| | 55 | 21.9 | 32 | 17 | 15 | - | CL |
| | 65 | 15.4 | 17 | 10 | 7 | - | CL-ML |
| | 75 | 18.5 | 27 | 16 | 11 | - | CL |
| | 80 | 15.7 | - | - | - | - | CL |
| | | | | | | | |
| W-102 | 5 | 15.6 | - | - | - | - | - |
| | 10 | 16.0 | 25 | 14 | 11 | - | CL |
| | 20 | 19.9 | 21 | 12 | 9 | - | CL |
| | 30 | 18.5 | 24 | 15 | 9 | - | CL |
| | 35 | 14.6 | 20 | 13 | 7 | - | CL-ML |
| | 40 | 20.8 | 28 | 16 | 12 | - | CL |
| | 45 | 20.6 | 28 | 14 | 14 | 2.0×10^{-8} | CL |
| | 55 | 21.1 | 33 | 16 | 17 | - | CL |
| | 65 | 40.4 | 47 | 21 | 26 | 1.8×10^{-8} | CL |
| | 80 | 24.2 | 35 | 20 | 15 | - | CL |
| | 85 | 11.6 | 19 | 12 | 7 | - | CL-ML |

*Indicates Unified Soil Classification

Sheet 1 of 3

Table 2

Allen Park Clay Mine
Allen Park, Michigan

SOIL CLASSIFICATION SUMMARY

| Boring Number | Sample Depth, Ft. | Moisture Content, % | Atterberg Limits | | | Permeability cm/sec | USC* Classification |
|------------------|----------------------|------------------------|------------------|----|----|------------------------|------------------------|
| | | | LL | PL | PI | | |
| W-103 | 10 | 27.6 | 45 | 23 | 22 | - | CL |
| | 20 | 26.8 | 28 | 17 | 11 | - | CL |
| | 30 | 17.6 | 25 | 15 | 10 | - | CL |
| | 35 | 18.8 | 24 | 14 | 10 | - | CL |
| | 40 | 19.9 | 25 | 15 | 10 | - | CL |
| | 45 | 20.1 | 28 | 16 | 12 | 2.4×10^{-8} | CL |
| | 55 | 20.5 | 30 | 16 | 14 | - | CL |
| | 65 | 23.3 | 32 | 17 | 15 | 3.0×10^{-8} | CL |
| | 75 | 22.3 | 28 | 17 | 11 | - | CL |
| | 85 | 16.0 | 26 | 15 | 11 | - | CL |
| | | | | | | | |
| W-104 | 5 | 26.3 | - | - | - | - | - |
| | 10 | 31.1 | 47 | 23 | 24 | - | CL |
| | 20 | 38.5 | 52 | 23 | 29 | - | CH |
| | 30 | 19.5 | 25 | 15 | 10 | - | CL |
| | 35 | 19.5 | 26 | 15 | 11 | - | CL |
| | 40 | 19.5 | 25 | 15 | 10 | - | CL |
| | 45 | 18.7 | 24 | 15 | 9 | 2.3×10^{-8} | CL |
| | 55 | 22.0 | 31 | 17 | 14 | - | CL |
| | 65 | 26.0 | 35 | 17 | 18 | 2.3×10^{-8} | CL |
| | 75 | 8.8 | - | - | - | - | SM |
| | 80 | 19.0 | - | - | - | - | CL |
| | | | | | | | |

*Indicates Unified Soil Classification

Sheet 2 of 3

Table 2

Allen Park Clay Mine
Allen Park, Michigan

SOIL CLASSIFICATION SUMMARY

| Boring Number | Sample Depth, Ft. | Moisture Content, % | Atterberg Limits | | | Permeability cm/sec | USC* Classification |
|------------------|----------------------|------------------------|------------------|----|----|------------------------|------------------------|
| | | | LL | PL | PI | | |
| W-105 | 10 | 29.8 | 40 | 21 | 19 | - | CL |
| | 20 | 33.9 | 38 | 19 | 19 | - | CL |
| | 30 | 20.1 | 25 | 15 | 10 | - | CL |
| | 35 | 19.7 | 30 | 15 | 15 | - | CL |
| | 40 | 20.4 | 25 | 16 | 9 | - | CL |
| | 45 | 20.8 | 30 | 16 | 14 | 2.3×10^{-8} | CL |
| | 55 | 21.5 | 31 | 15 | 16 | - | CL |
| | 65 | 25.6 | 34 | 20 | 14 | 3.2×10^{-8} | CL |

Additional lab data from past studies is included in Appendices C, E and F.

*Indicates Unified Soil Classification

Sheet 3 of 3

Table 2

GEOLOGY

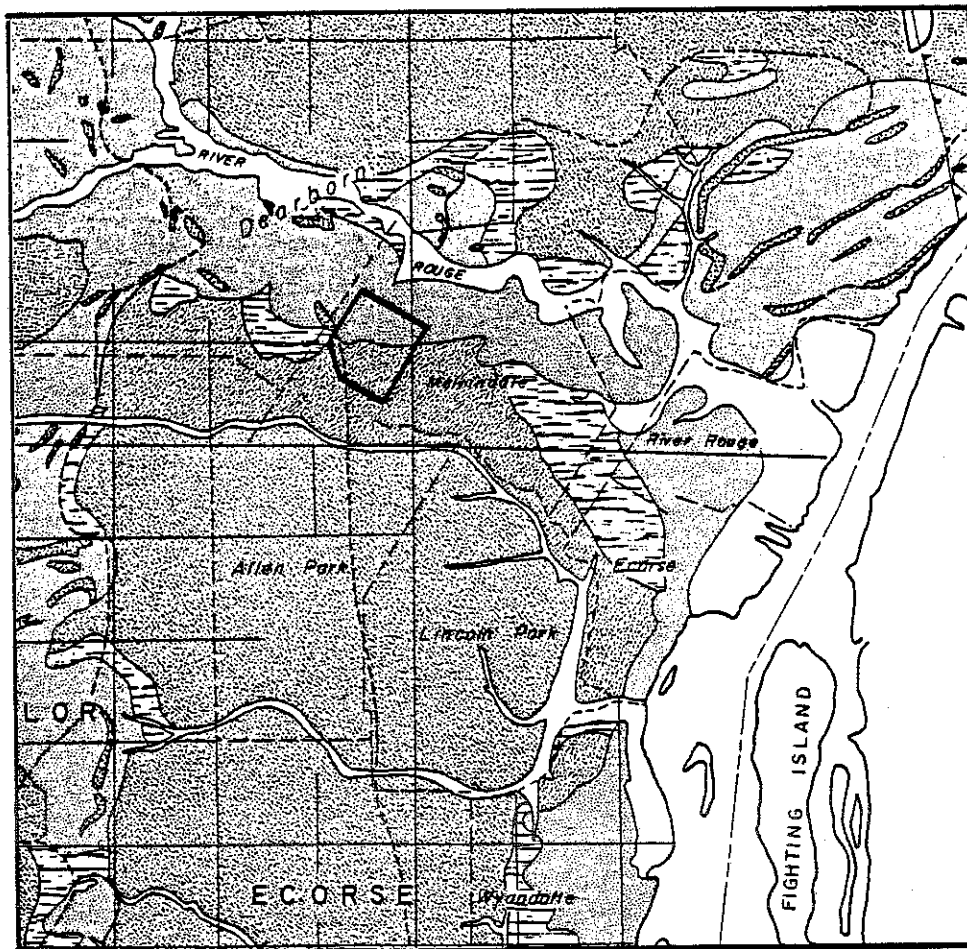
The present surface features of the area around southeastern Wayne County were formed during the Wisconsin stage of the Pleistocene glaciation. The Allen Park Clay Mine is situated within a glacial lake plain that was created when glacial meltwater became impounded between the moraines to the northwest and the receding Huron - Erie ice lobe to the southeast.

The surficial soils as shown on Figure 6 indicate deposits of either Lacustrine and Delta sand towards the northern half of the site and Lacustrine clay over the remainder. This, in general, was verified by the deposits of sand found at shallow depths at boring's W-101, W-102 and W-103 and the lack of a shallow sand deposit at W-104 and W-105.

The variation in composition and thickness of the glacial soils can be extreme for the glaciated area of southeast Michigan. However, the soils encountered at the project site consists predominantly of silty clays with varying amounts of fine sand with occasional pebbles or fine gravel. The overburden material as shown on Figure 7 is generally anywhere from 80 to 100 feet thick as confirmed by soil borings and other available geological information.

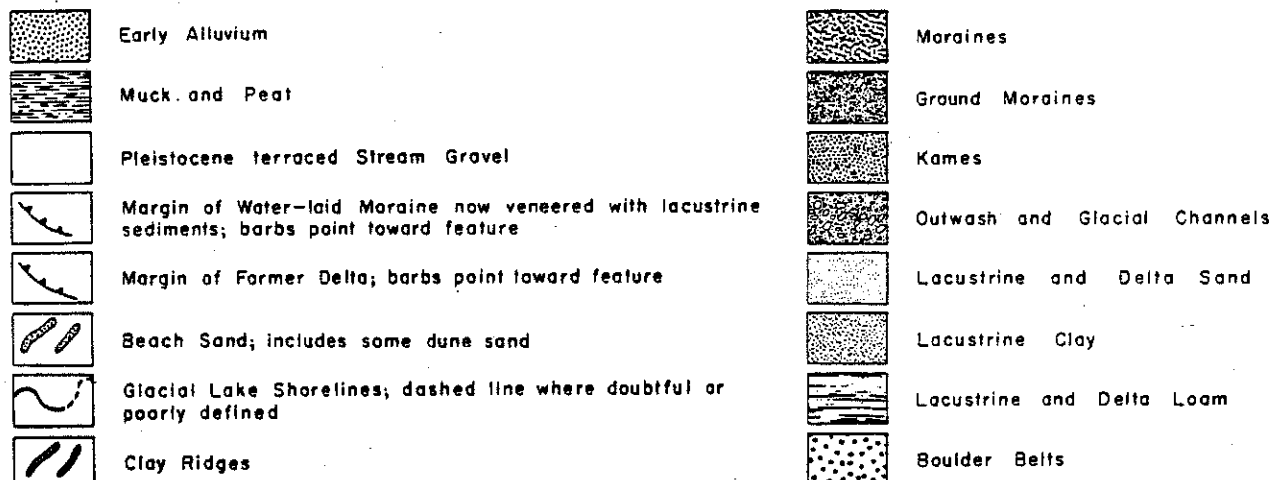
The elevation of the bedrock surface within this region is likely to be irregular due to erosion both prior to the glacial epoch, and from later repeated glacial advances. Figure 8 reveals a difference in bedrock elevation of up to 25 feet across the Allen Park site. The type of bedrock immediately below the site consists of Middle Devonian Dundee Limestone approximately 75 to 100 feet in thickness underlain by 250 to 350 feet of Detroit River Dolomite of the same geologic

period (See Figure 9). For additional detailed information refer to the deep well logs in Appendix H obtained from the Michigan Department of Natural Resources. (Please note that the deep well logs were used only as a guide since no known deep wells exist within approximately 1 or 2 miles of the site.)

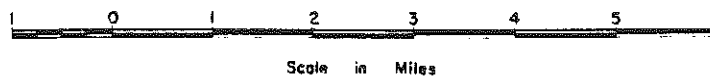


GLACIAL FEATURES OF WAYNE COUNTY, MICHIGAN

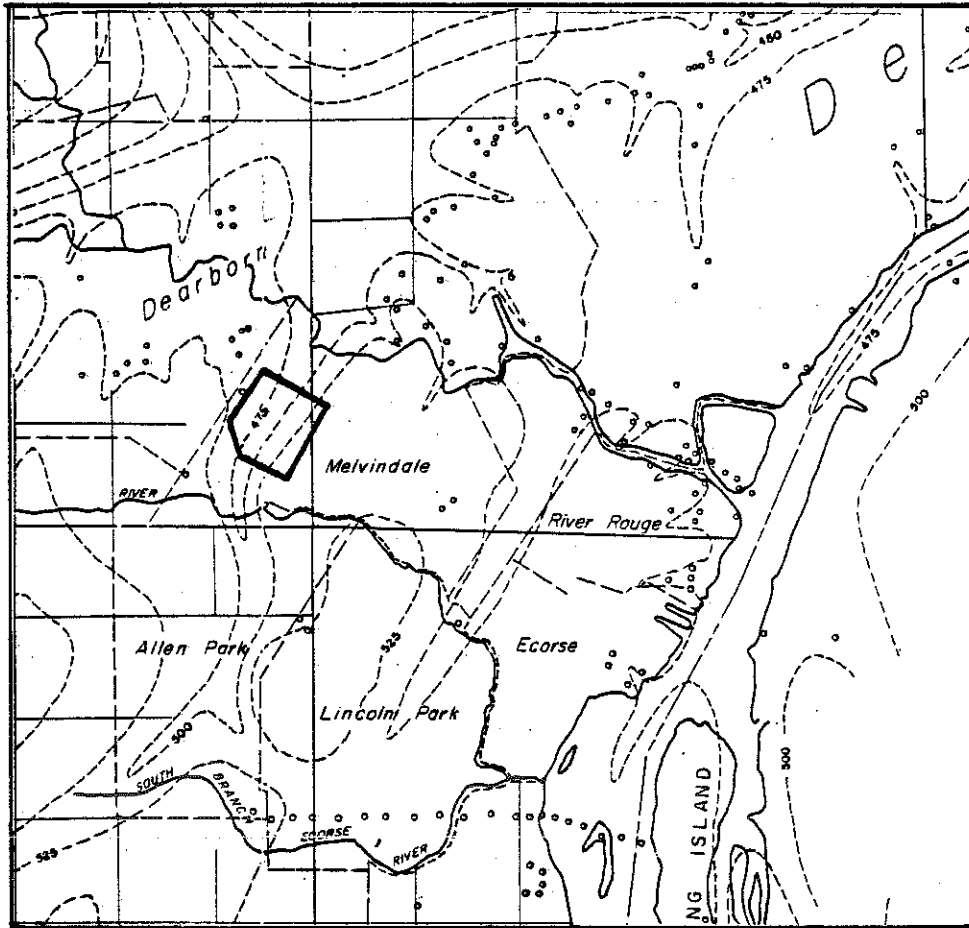
LEGEND



by
ANDREW J. MOZOLA
and
EUGENE I. SMITH
Wayne State University-1967

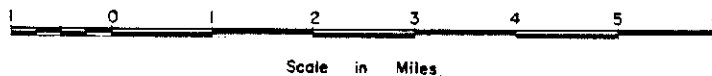


-24-



TOPOGRAPHY OF THE BEDROCK SURFACE OF WAYNE COUNTY, MICHIGAN

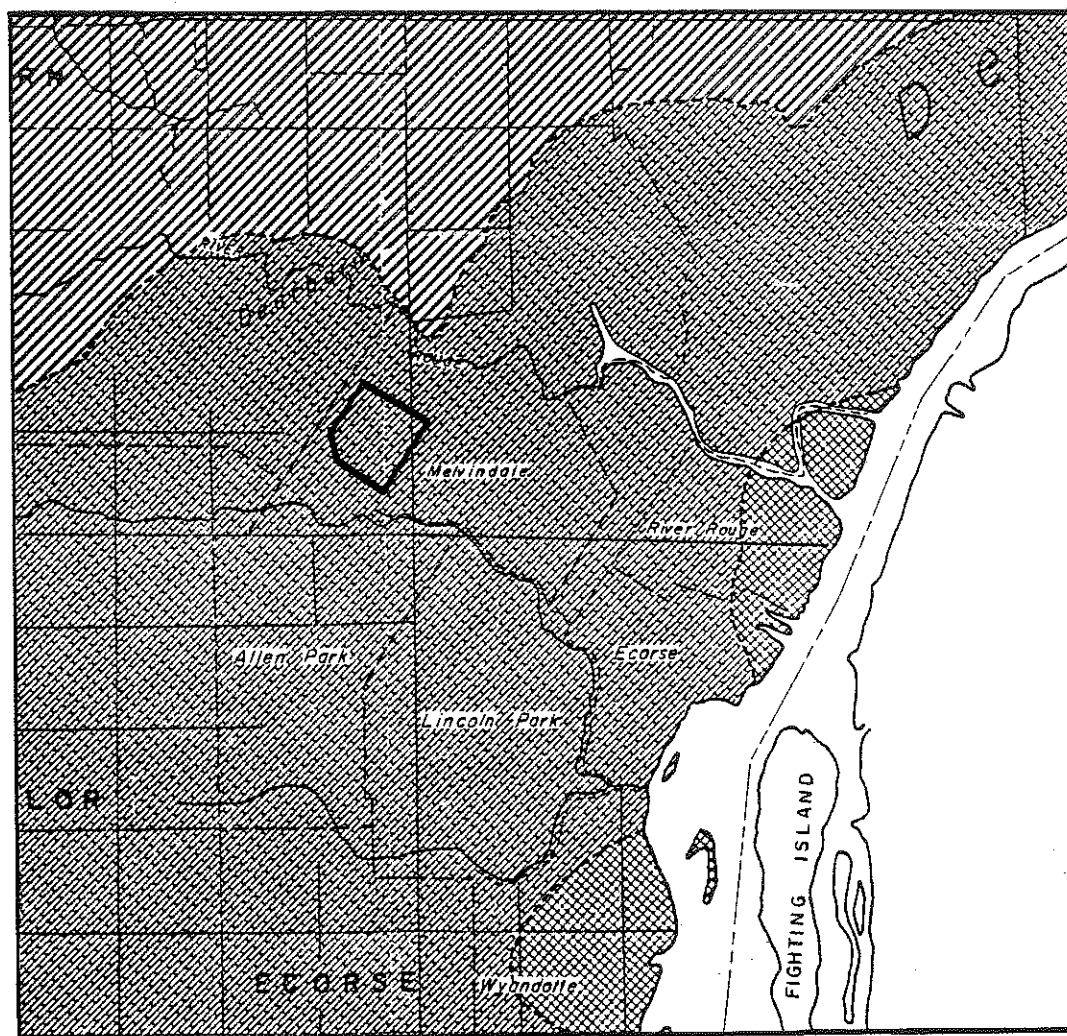
by
ANDREW J. MOZOLA
Wayne State University-1967



CONTOUR INTERVAL-25 FEET

NOTES

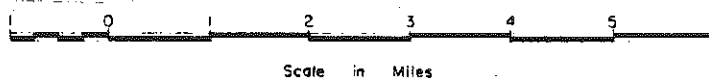
- TEST BORINGS AND WELLS REACHING OR PENETRATING BEDROCK.
- TEST BORINGS AND WELLS NOT REACHING BEDROCK.
- BEDROCK ELEVATIONS FROM SEISMIC DATA.



LEGEND

| | | |
|--|-----|------------------------|
| | Mc | COLDWATER SHALE |
| | Ms | SUNBURY SHALE |
| | Mb | BEREA SANDSTONE |
| | Mbd | BEDFORD SHALE |
| | Da | ANTRIM SHALE |
| | Di | TRAVERSE GROUP |
| | Dd | DUNDEE LIMESTONE |
| | Ddr | DETROIT RIVER DOLOMITE |
| | Ds | SYLVANIA SANDSTONE |

BEDROCK GEOLOGIC MAP OF WAYNE COUNTY, MICHIGAN



After "CENTENNIAL MAP OF SOUTHERN PENINSULA OF MICHIGAN" with modifications based on new data. Cartography by Dan W. Walchak, Department of Geology, Wayne State University, Detroit, Michigan, 1968. Revision of contacts by Andrew J. Mozola.

SUBSURFACE CONDITIONS

General

The type of foundation materials encountered have been visually classified and are described in detail on the boring logs. The results of the field penetration tests, water level observations, laboratory water content, Atterberg limits and unit weight determinations are presented on the boring logs. Representative samples of the soils are now stored in the laboratory for further analysis if desired. Unless notified to the contrary, all samples will be disposed of after three months.

The stratification of the soils as described herein, and as shown on the boring logs represents the soil conditions in the actual boring locations; other variations may occur between the borings. Lines of demarcation represent the approximate boundary between the soil types, but the transition may be gradual.

It is to be noted that, while the test borings are drilled and sampled by experienced drillers, it is sometimes difficult to record changes in stratification within narrow limits especially at great depths. In the absence of foreign substances, it is also difficult to distinguish between discolored soils and clean soil fill.

Description of Foundation Materials

The following discussion is based upon subsurface information obtained from the soil boring data gathered from current and past geotechnical studies by Michigan Testing Engineers, Inc. at the Allen Park Clay Mine.

The soils encountered within the upper 10 to 15 feet at the boring (well) locations consist of either a fine to medium brown sand,

a brown to gray silty clay or a mixture of these two soils types. The cohesionless soil types are generally loose to medium dense in consistency while the more cohesive soils are medium to stiff. Below these soils, a layer of gray silty clay was encountered and this stratum continues to a depth ranging from about 72 feet to 86 feet below the existing ground surface. This silty clay stratum contains, in general, 15 to 25 percent sand (4.75 mm - 0.074 mm) and usually not more than five percent fine gravel (> 4.76 mm). The natural water content of this layer ranges from about 15 to 40 percent, with the average near 20 percent. Results of Atterberg limits determinations reveal liquid limits (LL) and plastic indices (PI) ranging from 17 to 52 percent and 7 to 29 percent, respectively. The majority of the samples, however, showed an average LL of about 28 and a PI of about 12. Classification of this material by the Unified Classification System indicates this soil to be predominantly a (CL) soil (Inorganic clay of low to medium plasticity). Within this strata, occasional zones of borderline (ML-CL) soils are present and one test confirmed a zone of (CH) soil. (A description of the Unified Classification System is found on Figure 10).

Eleven permeability tests were performed on selected shelly tube samples obtained from the silty clay stratum during the current field investigation. Results of these tests indicate the coefficient of permeability ranges from 1.8×10^{-8} cm/sec to 4.1×10^{-8} cm/sec. (Results of permeability tests from previous investigations are found in Appendices C, E and F.)

Below the silty clay, a layer of gray, saturated medium sand (SP) with a trace of fine gravel was encountered ranging from about one

TABLE 2.16 UNIFIED SOIL CLASSIFICATION SYSTEM. (ASTM D-2487)

| Major Divisions | | | Group Symbols | Typical Names | Laboratory Classification Criteria | | |
|--|--|---|---|---|---|---|---|
| Coarse-grained soils (More than half of material is larger than No. 200 sieve size) | Gravels (More than half of coarse fraction is larger than No. 4 sieve size) | Clean gravels (Little or no fines) | GW | Well-graded gravels, gravel-sand mixtures, little or no fines | $C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3 | | |
| | | | GP | Poorly graded gravels, gravel-sand mixtures, little or no fines | Not meeting all gradation requirements for GW | | |
| | | Gravels with fines (Appreciable amount of fines) | GM ^a | d | Silty gravels, gravel-sand-silt mixtures | Atterberg limits below "A" line or P.I. less than 4 | Above "A" line with P.I. between 4 and 7 are <i>borderline</i> cases requiring use of dual symbols |
| | | | | u | | | |
| | GC | Clayey gravels, gravel-sand-clay mixtures | Atterberg limits below "A" line with P.I. greater than 7 | | | | |
| | | | | | | | |
| | Sands (More than half of coarse fraction is smaller than No. 4 sieve size) | Clean sands (Little or no fines) | SW | Well-graded sands, gravelly sands, little or no fines | $C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3 | | |
| | | | SP | Poorly graded sands, gravelly sands, little or no fines | Not meeting all gradation requirements for SW | | |
| | | Sands with fines (Appreciable amount of fines) | SM ^a | d | Silty sands, sand-silt mixtures | Atterberg limits above "A" line or P.I. less than 4 | Limits plotting in hatched zone with P.I. between 4 and 7 are <i>borderline</i> cases requiring use of dual symbols |
| | | | | u | | | |
| SC | | | Clayey sands, sand-clay mixtures | Atterberg limits above "A" line with P.I. greater than 7 | | | |
| | | | | | | | |
| Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than 5 per cent More than 12 per cent 5 to 12 per cent GW, GP, SW, SP GM, GC, SM, SC <i>Borderline</i> cases requiring dual symbols ^b | | | | | | | |
| Fine-grained soils (More than half material is smaller than No. 200 sieve) | Silt and clays (Liquid limit less than 50) | ML | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity | | | | |
| | | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays | | | | |
| | | OL | Organic silts and organic silty clays of low plasticity | | | | |
| | Silt and clays (Liquid limit greater than 50) | MH | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts | | | | |
| | | CH | Inorganic clays of high plasticity, fat clays | | | | |
| | | OH | Organic clays of medium to high plasticity, organic silts | | | | |
| | Highly organic soils | Pt | Peat and other highly organic soils | | | | |
| | | | | | | <p>Plasticity Chart</p> | |

^aDivision of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u used when L.L. is greater than 28.

^bBorderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC, well-graded gravel-sand mixture with clay binder.

Figure 10

to six feet in thickness. This sand, in general, overlies an extremely dense layer of silty sand and clay (Hardpan). At boring (well) W-104 the sand layer, approximately 6 inches thick, is apparently sandwiched between two layers of the hardpan soils with the upper layer approximately $2\frac{1}{2}$ feet thick. At W-101, the hardpan layer encountered was about one foot thick, underlain by a very stiff, very silty clay.

(Detailed soil boring logs are presented in Appendix A. A summary of laboratory test results was included previously on Table 2).

GROUND WATER

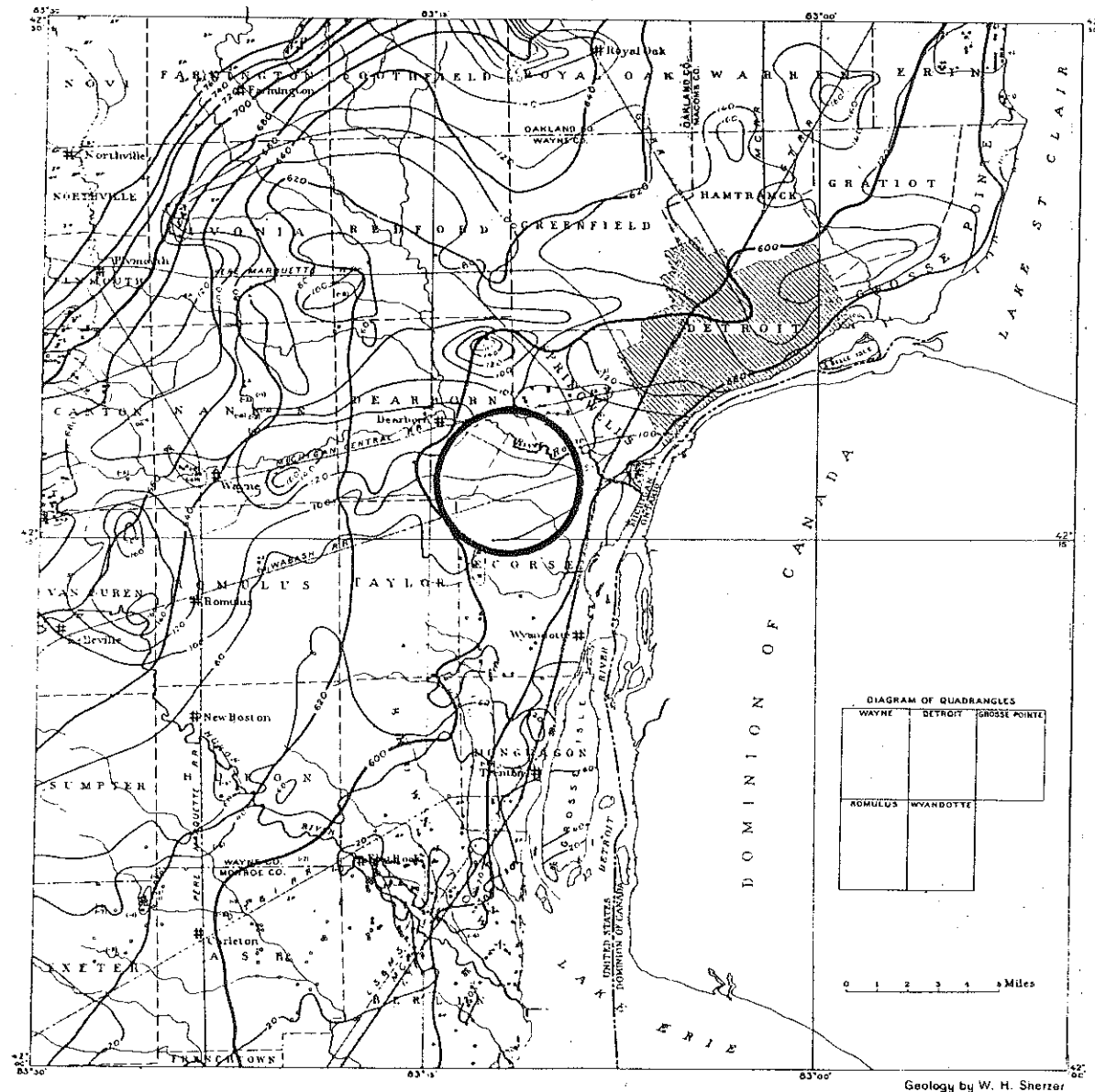
General

Except for a minor water table encountered within the shallow sand layer near the surface at W-102 and W-103, the only other ground water encountered during this investigation was within the sand and hardpan layers below the thick deposit of silty clay. The elevation at which this aquifer was encountered ranged from +505 (W-102) to +522 (W-105). This lower water bearing stratum is an artesian aquifer with static water levels reaching a height of up to 12 feet above the existing ground surface. From available literature, it is believed that this aquifer is recharged within the belt of moraines near west and northwest Wayne County. Figure 11 (taken from U.S.G.S. survey, circa: early 1900's) shows a contour map of artesian water in an area southeast of the Defiance Moraine. The artesian head is shown by lines of equal pressure. From this figure, the hydraulic gradient was calculated to be decreasing at a rate of approximately 3 to 4 feet per mile in an east-southeast direction. The static ground water elevations recorded at the monitor wells on November 4, 1981 are shown on the Ground Water Elevation Map in Figure 12. The recorded values show the general trend of groundwater emanating near Well No. 5 and flowing outward toward the other wells, and especially towards localized low areas near Well No. 7 and 2.

It is believed that the regional trend of ground water flow in this area is in the east-southeast direction, as shown on Figure 11, however, the water level readings shown on Figure 12 indicate ground water flow towards localized depressed areas near Well No's. 2 and 7. As more data becomes available, this condition can be verified.

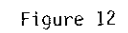
It should be noted that the static water levels recorded at

ARTESIAN WATER



Allen Park Clay Mine
Allen Park, Michigan

1. General Layout Of Site Facilities
From Drawing Supplied By Wayne
Disposal, Inc., Entitled "Allen Park
Clay Mine" Dated 9-12-79, Rev.
5-1-81, Sheet No. C-2 of Drawing
No. 79P - 23.6.



the site monitor wells are very similar to those shown on the artesian water contour map which may indicate a fairly consistent hydraulic condition exists within this aquifer. Also, permeability can vary within a confined aquifer due to local changes within lithology and therefore the piezometric surface may not be a smooth plane, but rather somewhat irregular.

Ground Water Quality

The latest chemical analyses of water samples obtained from the observation/monitoring wells at the Allen Park Clay Mine are shown on Table 3. Listed are all current wells, both within the deep and shallow aquifer, used to monitor both hazardous and non-hazardous landfilling operations. Listed on Table 3 (sheet 1 of 3) are the parameters for which the EPA has established interim drinking water standards. In general, the measured levels are at or below the established limits except for a few of the metals. At Well No. 2D (located within the deep aquifer), the measured level of cadmium was 0.24 mg/l; the EPA interim standard is 0.01 mg/l. It was suggested by Canton Analytical Laboratory (who performed the test) that the high cadmium level may be from the interior of the galvanized well standpipe. (It should be noted that cadmium levels at W-2 determined by the DNR during December, 1980 were below 0.020 mg/l.)

In addition, levels of lead at Well's W-2S, 5S and 10S ranged from 0.065 to 0.22 mg/l, which have exceeded the EPA interim standard of 0.05 mg/l.

Other parameters analyzed from monitor well samples are included on sheets 2 and 3 of Table 3. Currently, no established EPA standards are available for these parameters.

As additional ground water data becomes available, parameters which have exceeded recommended limits can be verified. (Refer to the ground water Monitoring Program section for the well sampling schedule and parameters to be analyzed).

Useability of Aquifers

Shallow Aquifer - The Michigan Department of Public Health does not permit drinking water wells to be located less than 25 feet below the ground surface. Since the upper, shallow aquifer was found to be generally less than 10 feet below grade, this aquifer is not a useable source of drinking water.

Deep Aquifer - The lower aquifer is located approximately 70 feet below the existing grade at the Allen Park site. Chemical analyses of ground water samples show this source of water to be highly mineralized. In addition, a few of the parameters for which the EPA has drinking water standards have been exceeded. Therefore, to use the lower aquifer as a source of drinking water would probably require treatment.

From discussions with the Wayne County Department of Environmental Health and the City of Allen Park Water Board, it was learned that no known water wells within Allen Park exist and that both residential and commercial water service are supplied by the city of Detroit.

GROUND WATER QUALITY ANALYSIS
(Values in mg/l unless otherwise noted)

| PARAMETER | WELL NUMBER | | | | | | | | | | | | LIMITS (Mg/l) ⁽³⁾ |
|-------------------------------|---------------------|------------------------|-------|-------|-------|-------|-------|--------|---------|---------|---------|--------|------------------------------|
| | W-2S ⁽¹⁾ | W-2D ⁽²⁾ | W-5S | W-5D | W-7D | W-10S | W-10D | W-101D | W-102D | W-103D | W-104D | W-105D | |
| Arsenic, As | - | K0.0003 ⁽⁴⁾ | - | - | - | - | - | - | K0.0003 | K0.0003 | K0.0003 | - | 0.05 |
| Barium, Ba | - | K0.1 | - | - | - | - | - | - | K0.1 | K0.1 | K0.1 | - | 1.0 |
| Cadmium, Cd | K0.02 | 0.24 | K0.02 | K0.02 | K0.02 | K0.02 | K0.02 | - | K0.01 | K0.01 | K0.01 | - | 0.01 |
| Chromium, Cr | K0.05 | K0.01 | K0.05 | K0.01 | K0.01 | K0.05 | K0.01 | K0.01 | K0.01 | K0.01 | K0.01 | K0.01 | 0.05 |
| Flouride, F | - | 0.94 | - | - | - | - | - | - | 1.42 | 1.31 | 1.31 | - | 1.4 - 2.4 |
| Lead, Pb | 0.095 | K0.05 | 0.22 | 0.05 | K0.05 | 0.065 | K0.05 | K0.05 | K0.05 | K0.05 | K0.05 | K0.05 | 0.05 |
| Mercury, Hg | - | K0.0002 | - | - | - | - | - | - | K0.0002 | K0.0002 | K0.0002 | - | 0.002 |
| Nitrate as N, NO ₃ | 0.02 | K0.1 | 0.04 | K0.1 | K0.1 | 0.15 | K0.1 | K0.1 | K0.1 | K0.1 | K0.1 | K0.1 | 10 |
| Selenium, Se | - | K0.0003 | - | - | - | - | - | - | K0.0003 | K0.0003 | K0.0003 | - | 0.01 |
| Silver, Ag | - | K0.01 | - | - | - | - | - | - | K0.01 | K0.01 | K0.01 | - | 0.05 |
| En Irin | - | K0.0002 | - | - | - | - | - | - | K0.0002 | K0.0002 | K0.0002 | - | 0.0002 |
| Lindane | - | K0.004 | - | - | - | - | - | - | K0.004 | K0.004 | K0.004 | - | 0.004 |
| Methoxychlor | - | K0.01 | - | - | - | - | - | - | K0.01 | K0.01 | K0.01 | - | 0.1 |
| Toxaphene | - | K0.005 | - | - | - | - | - | - | K0.005 | K0.005 | K0.005 | - | 0.005 |
| 2, 4-D | - | K0.1 | - | - | - | - | - | - | K0.1 | K0.1 | K0.1 | - | 0.1 |
| 2, 4, 5 - TP Silvex | - | K0.001 | - | - | - | - | - | - | K0.001 | K0.001 | K0.001 | - | 0.01 |
| Radium, Ra | - | K5 | - | - | - | - | - | - | K5 | K5 | K5 | - | 5 |
| Gross Alpha pCi/l | - | K5 | - | - | - | - | - | - | K5 | K5 | K5 | - | 15 pCi/l |
| Gross Beta pCi/l | - | K5 | - | - | - | - | - | - | K5 | K5 | K5 | - | 4 Millirem/yr |
| Coliform Bacteria /100 ml | - | 2 | - | - | - | - | - | - | 4 | K2 | 4 | - | 1/100 ml |

Notes:

(1) W-2S: Indicates Well No. 2 located within the Shallow Aquifer.

(2) W-2D: Indicates Well No. 2 located with the Deep Aquifer.

(3) "EPA Interim Primary Drinking Water Standards", Federal Register, Appendix III, Part 265, p. 33257, May 19, 1980.

(4) K: Indicates "less than" value shown.

I. Parameters listed in this Table represent a composite of the latest results of samples tested on one of the following dates:

A. - December 1980 by: Michigan Department of Natural Resources
B. - October 1981 by: Canton Analytical Laboratory

II. Additional water quality data from previous studies is found in Appendix F.

III. Well No's W-101 through W-105 were constructed using PVC pipe while the remainder were constructed using galvanized pipe.

Allen Park Clay Mine
Allen Park, Michigan

GROUND WATER QUALITY ANALYSIS
(Values in mg/l unless otherwise noted)

| PARAMETER | WELL NUMBER | | | | | | | | | | | | LIMITS |
|-------------------------------|-------------|---------|---------|---------|---------|---------|---------|--------|--------|--------|--------|--------|---|
| | W-2S | W-2D | W-5S | W-5D | W-7D | W-10S | W-10D | W-101D | W-102D | W-103D | W-104D | W-105D | |
| Alkalinity | 157 | 164 | 255 | 640 | 92 | 127 | 184 | - | - | - | - | - | Currently, the EPA has not established water quality limits for these parameters. |
| Ammonia, NH ₃ | 0.48 | 0.5 | 0.12 | 0.3 | 0.75 | 0.42 | 0.5 | 0.5 | 0.5 | 0.40 | 0.5 | 0.40 | |
| BiCarbonate, HCO ₃ | 192 | 200 | 315 | 675 | 0 | 155 | 225 | - | - | - | - | - | |
| Calcium, Ca | 300 | 200 | 340 | 10 | 370 | 280 | 370 | 190 | 160 | 37 | 310 | 330 | |
| Carbonate, CO ₃ | 0 | 0 | 0 | 53 | 22 | 0 | 0 | - | - | - | - | - | |
| Chloride, Cl | 91 | 150 | 1200 | 126 | 150 | 180 | 150 | 135 | 130 | 25 | 140 | 145 | |
| COD | 15 | 2.6 | 84 | 3.8 | 1.9 | 20 | 7.0 | 1.6 | 0.6 | 1.6 | 1.0 | 1.0 | |
| Copper, Cu | 0.19 | K0.02 | 0.04 | 0.2 | K0.02 | 0.13 | 0.12 | - | - | - | - | - | |
| Cyanide, CN | K0.005 | K0.005 | K0.005 | K0.005 | 0.019 | K0.005 | K0.005 | - | - | - | - | - | |
| Hardness | - | 1600 | - | 800 | 950 | - | 1650 | 1050 | 1750 | 160 | 1500 | 1500 | |
| Iron, Fe | 3.7 | K0.03 | 4.6 | K0.03 | K0.03 | 8.0 | 0.24 | K0.03 | K0.03 | K0.03 | 0.32 | 1.4 | |
| Magnesium, Mg | 100 | 160 | 100 | 160 | 24 | 90 | 200 | 140 | 210 | 8.2 | 180 | 150 | |
| Manganese, Mn | - | K0.01 | - | - | - | - | - | - | K0.01 | K0.01 | 0.06 | - | |
| Nickel, Ni | K0.05 | 0.05 | K0.05 | K0.05 | K0.05 | K0.05 | K0.05 | - | - | - | - | - | |
| Nitrite, NO ₂ | K0.01 | 0.002 | K0.01 | K0.002 | K0.002 | 0.01 | K0.002 | 0.004 | 0.002 | K0.002 | K0.002 | K0.002 | |
| Nitrogen (Organic) | 0.50 | 0.60 | 0.42 | 0.29 | 0.42 | 0.54 | 0.26 | - | - | - | - | - | |
| PCB A-1242 | K0.0001 | K0.0001 | K0.0001 | K0.0001 | K0.0001 | K0.0001 | K0.0001 | - | - | - | - | - | |
| PCB A-1254 | K0.0001 | K0.0001 | K0.0001 | K0.0001 | K0.0001 | K0.0001 | K0.0001 | - | - | - | - | - | |
| PCB A-1260 | K0.0001 | K0.0001 | K0.0001 | K0.0001 | K0.0001 | K0.0001 | K0.0001 | - | - | - | - | - | |

See Sheet 1 of 3 for Notes.

Allen Park Clay Mine
Allen Park, Michigan

GROUND WATER QUALITY ANALYSIS
(Values in mg/l unless otherwise noted)

| PARAMETER | WELL NUMBER | | | | | | | | | | | | LIMITS (Mg/l) |
|--------------------------------------|------------------|--------|--------|-------|-------|-------|-------|--------|---------|--------|--------|--------|---|
| | W-2S | W-2D | W-5S | W-5D | W-7D | W-10S | W-10D | W-101D | W-102D | W-103D | W-104D | W-105D | |
| pH | 7.8 | 7.7 | 7.2 | 9.6 | 10.0 | 7.6 | 7.8 | 7.1 | 8.4 | 8.6 | 8.0 | 7.1 | Currently, the EPA has not established water quality limits for these parameters. |
| pH | - | 8.0 | - | - | - | - | - | - | 8.1 | 8.3 | 8.0 | - | |
| pH | - | 7.9 | - | - | - | - | - | - | 8.1 | 8.4 | 8.0 | - | |
| pH | - | 8.0 | - | - | - | - | - | - | 8.1 | 8.5 | 8.1 | - | |
| Phenol | 0.029 | 0.008 | K0.005 | 0.021 | 0.023 | 0.005 | 0.009 | - | K0.005 | K0.005 | K0.005 | - | |
| Potassium, K | 3.3 | 5.3 | 1.5 | 4.2 | 19 | 2.5 | 4.9 | - | - | - | - | - | |
| Resistivity - TF | 1900 | 1800 | 3100 | 1000 | 1400 | 1700 | 2900 | - | - | - | - | - | |
| Sodium, Na | 100 | 110 | 380 | 100 | 120 | 95 | 90 | 120 | 100 | 6.0 | 100 | 90 | |
| Specific Conductivity, μ Mhos/cm | 2200 | 2500 | 4100 | 1550 | 2250 | 2150 | 3000 | 2400 | 2500 | 300 | 2550 | 2600 | |
| Specific Conductivity, μ Mhos/cm | - | 2400 | - | - | - | - | - | - | 2450 | 300 | 2500 | - | |
| Specific Conductivity, μ Mhos/cm | - | 2200 | - | - | - | - | - | - | 2300 | 300 | 2400 | - | |
| Specific Conductivity, μ Mhos/cm | - | 2200 | - | - | - | - | - | - | 2300 | 300 | 2400 | - | |
| Sulfate, SO ₄ | 1000 | 1050 | 200 | 240 | 1300 | 830 | 2100 | 1250 | 1200 | 46 | 1350 | 1300 | |
| Sulfide, S | K0.02 | 2.6 | K0.02 | 0.28 | 0.18 | K0.02 | 0.71 | - | - | - | - | - | |
| Total Organic Carbon | 5.8 | 7.7 | 24 | 9 | 7 | 6.1 | 7 | 11 | 5.6 | 5.6 | 6.0 | 11 | |
| Total Organic Carbon | - | 7.0 | - | - | - | - | - | - | 6.0 | 6.0 | 6.8 | - | |
| Total Organic Carbon | - | 7.7 | - | - | - | - | - | - | 5.6 | 5.6 | 6.6 | - | |
| Total Organic Carbon | - | 7.6 | - | - | - | - | - | - | 6.6 | 6.6 | 6.6 | - | |
| Total Organic Halides | - | 0.005 | - | - | - | - | - | - | 0.0083 | 0.0308 | K0.005 | - | |
| Total Organic Halides | - | K0.005 | - | - | - | - | - | - | 0.0063 | 0.0302 | K0.005 | - | |
| Total Organic Halides | - | K0.005 | - | - | - | - | - | - | 0.0073 | 0.0311 | K0.005 | - | |
| Total Organic Halides | - | K0.005 | - | - | - | - | - | - | 0.00886 | 0.0290 | K0.005 | - | |
| Volatile Hydrocarbons | U ⁽¹⁾ | U | * | U | U | U | U | - | - | - | - | - | |
| Zinc, Zn | 9.5 | 26 | 14 | 15 | 0.065 | 10 | 37 | - | - | - | - | - | |

(1) Indicates Parameter was Undetected
* Unknown Non-Halogenated Hydrocarbon

See Sheet 1 of 3 For Additional Notes.

SUMMARY CONCLUSIONS AND RECOMMENDATIONSGeneral

The results of this study indicate the geologic and ground water conditions at the Allen Park Clay Mine will permit the continued safe storage of the classified hazardous wastes. Soil borings made during the present and past studies reveal a thick, uniform silty clay layer (classified as predominantly a CL soil) which extends downward to an elevation ranging from +505 to +522 at the boring locations. Currently, the base elevation of Cell No. 1 is approximately +550. Therefore, the thickness of the clay layer below the cell is generally in excess of 25 feet. Laboratory permeability test results of undisturbed shelly tube samples of this silty clay layer from past and current studies at this site did not exceed 6.0×10^{-8} cm/sec.

In addition, no apparent continuous or extensive sand layers are present within this silty clay layer as confirmed during classification of secured soil samples.

Below the silty clay layer exists a lower, confined artesian aquifer with a static water level that, in general, rises to an elevation of +591 to +605 at the monitor wells. It is extremely unlikely that any leachate from the landfill will reach this aquifer, since there is a positive upward flow from the aquifer. The combination of the uniform, thick low permeable clays and the upward flow of ground water has created highly favorable conditions for containment of the hazardous wastes.

Ground Water Monitoring Program

Well No. 2 has been designated as the upgradient well and well number's W-102, W-103 and W-104 will be used as the downgradient wells for purposes of monitoring the ground water as required for the hazardous landfilling area. Additionally, it is recommended that Well No. 5 also be

used as an upgradient well since the static water level at this location within the lower aquifer had the highest recorded elevation of the deep monitoring wells.

It is recommended that the proposed RCRA rules regarding groundwater monitoring for hazardous waste facilities published in the May 19, 1980 Federal Register (Parts 265.91 through 265.94, pp 33240-42) be used as guidelines for monitoring the groundwater at Well No's. W-2, W-5, W-102, W-103, and W-104 at the Allen Park Clay Mine. The parameters and sampling schedule as outlined in this document follows:

I) Parameters for which the EPA has drinking water standards:

| | |
|--------------|-------------------|
| Arsenic | Endrin |
| Barium | Lindane |
| Cadmium | Methoxychlor |
| Chromium | Toxaphene |
| Fluoride | 2, 4-D |
| Lead | 2, 4, 5-TP Silvex |
| Mercury | Radium |
| Nitrate as N | Gross Alpha |
| Selenium | Gross Beta |
| Silver | Coliform Bacteria |

Concentrations of the above parameters should be tested on a quarterly basis for the first year.

II) Water Quality Parameters:

| | |
|-----------|---------|
| Chloride | Phenols |
| Iron | Sodium |
| Manganese | Sulfate |

III) Contamination Indicators: (At least four replicate measurements must be obtained for each sample).

| | |
|----------------------|-----------------------|
| pH | Total Organic Carbon |
| Specific Conductance | Total Organic Halogen |

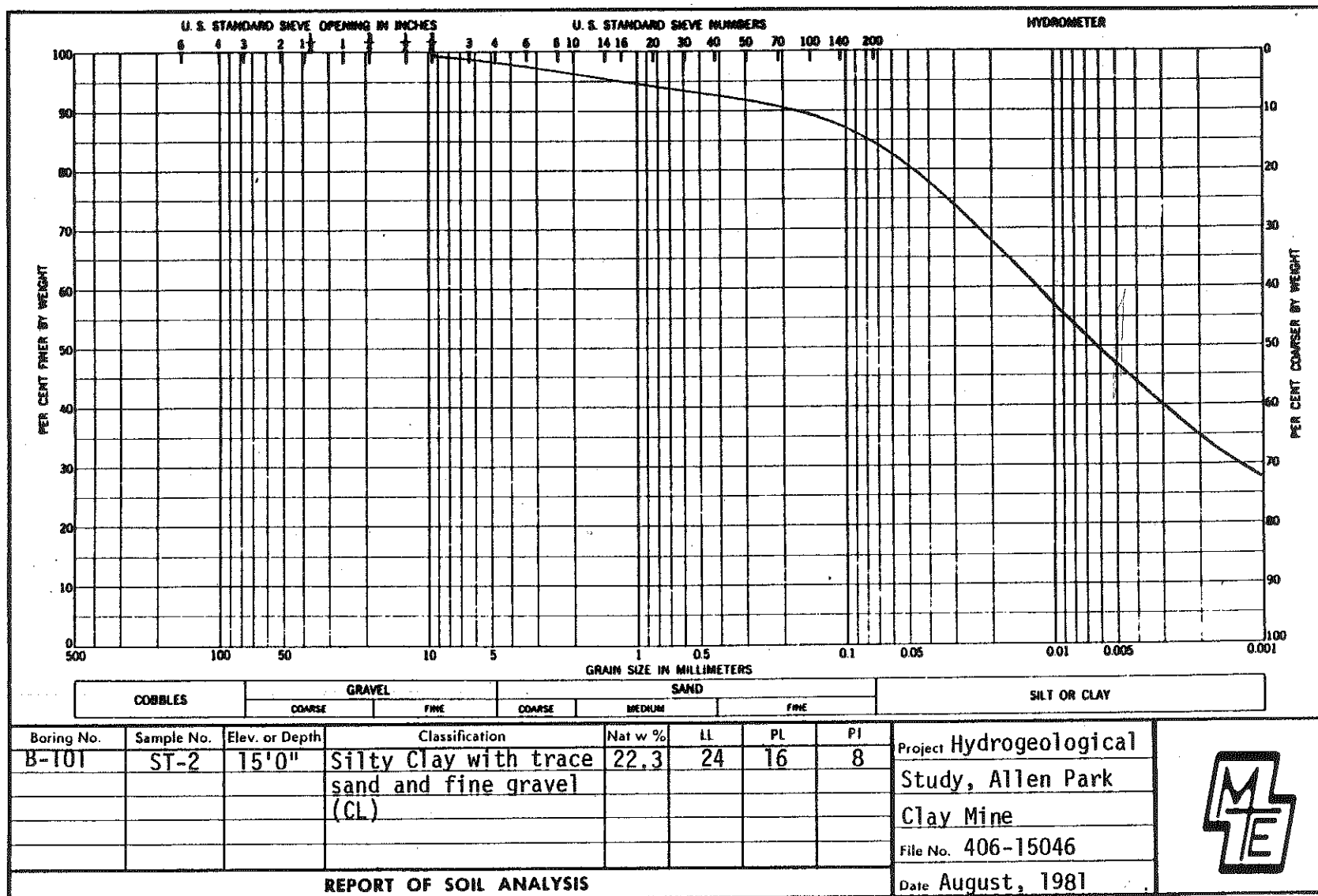
After the first year, ground water quality parameters (Part II) must be analyzed at least annually and the Contamination Indicators (Part III) must be analyzed at least semi-annually.

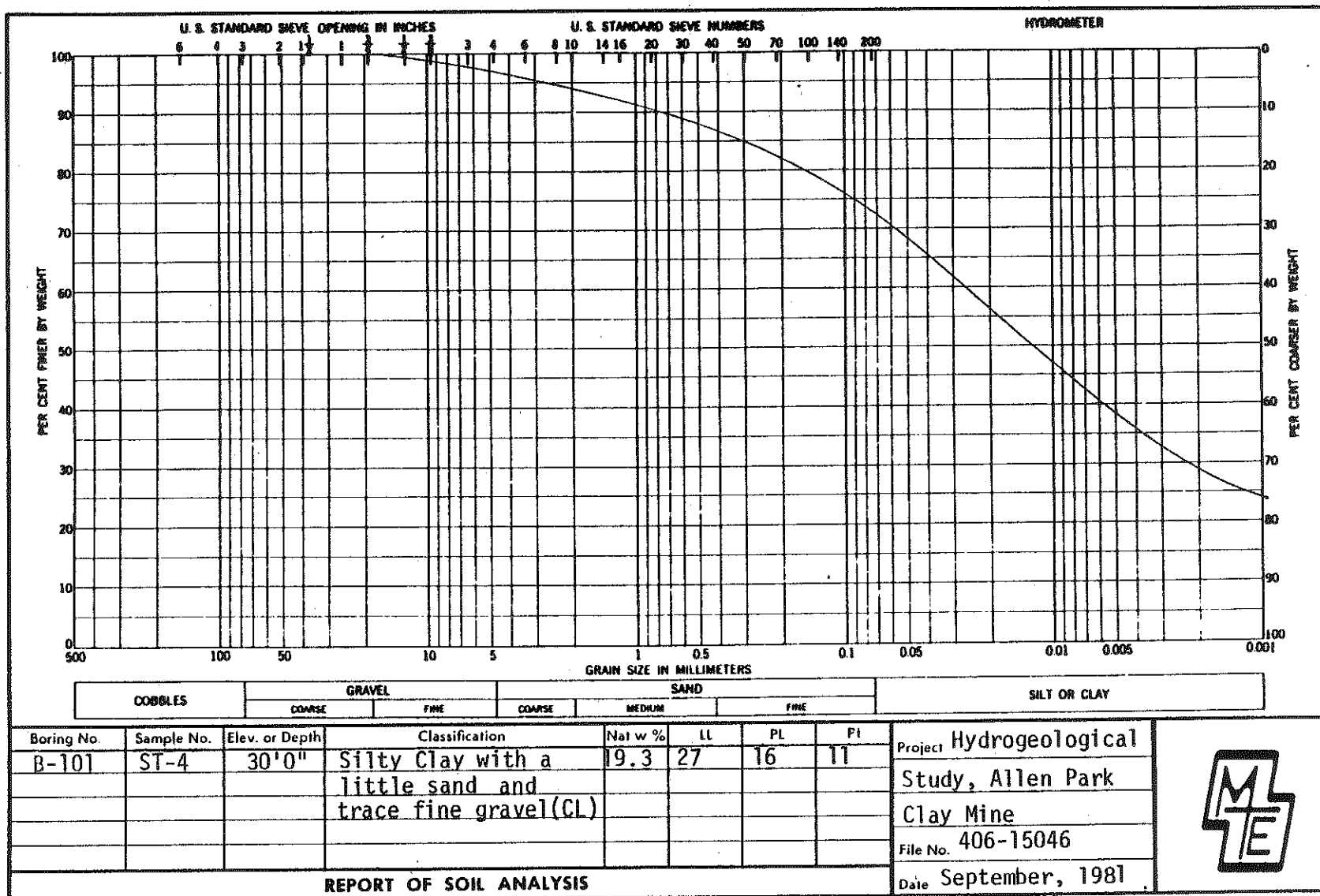
Ground water elevations should be determined at each monitoring well when sampling for chemical analysis. (Depending upon the climatic conditions and seasonal fluctuations within the aquifer, one or more of the monitor wells may be flowing. Therefore, to obtain a true ground water level, the flowing well must be extended with a coupled section of PVC pipe to allow the water level to stabilize. The well should be allowed to stabilize for at least one week to account for hydraulic lag prior to monitoring.)

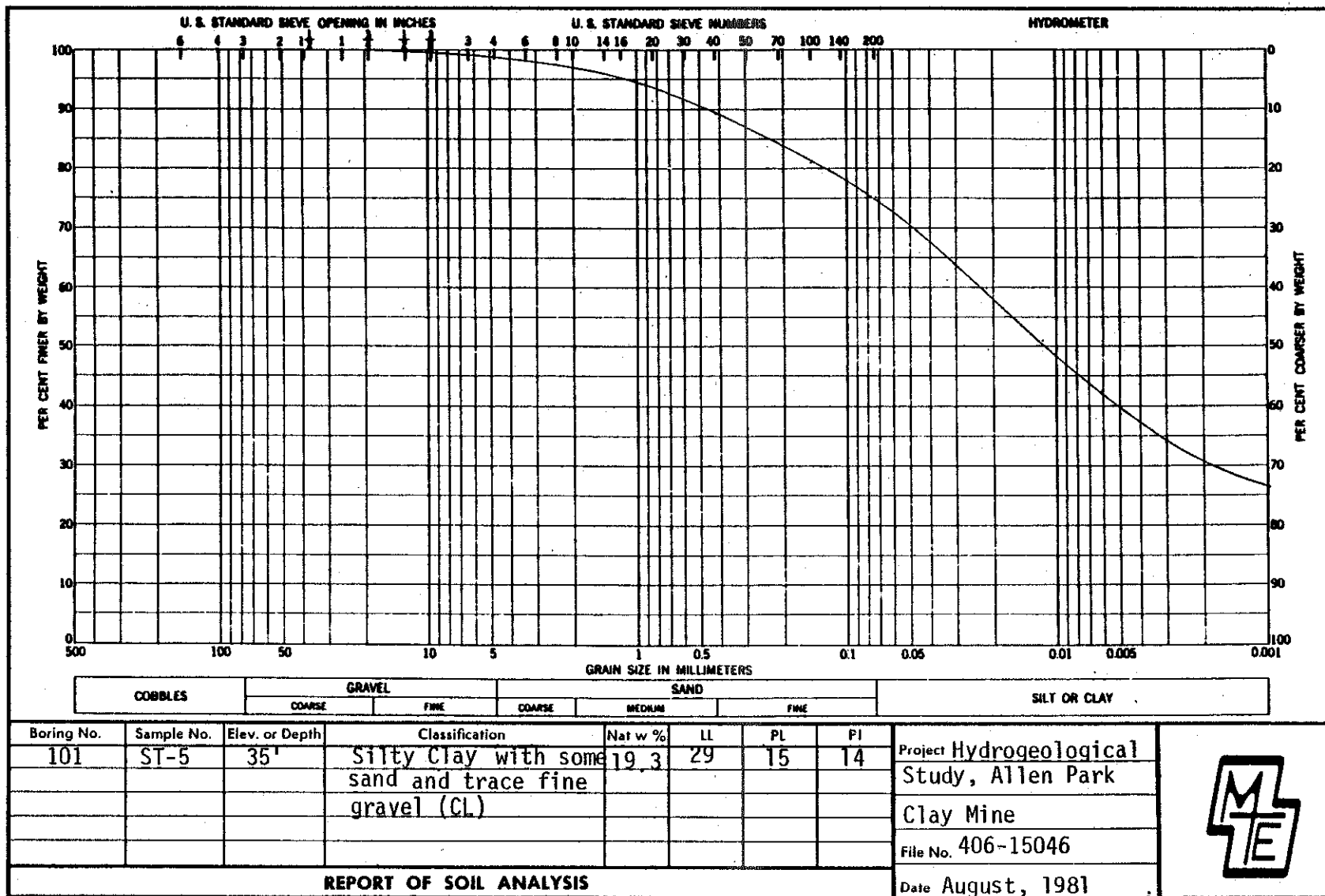
The remainder of the monitoring wells should be sampled and analyzed for the standard parameters as required by the Michigan Department of Natural Resources for Type II Landfills.

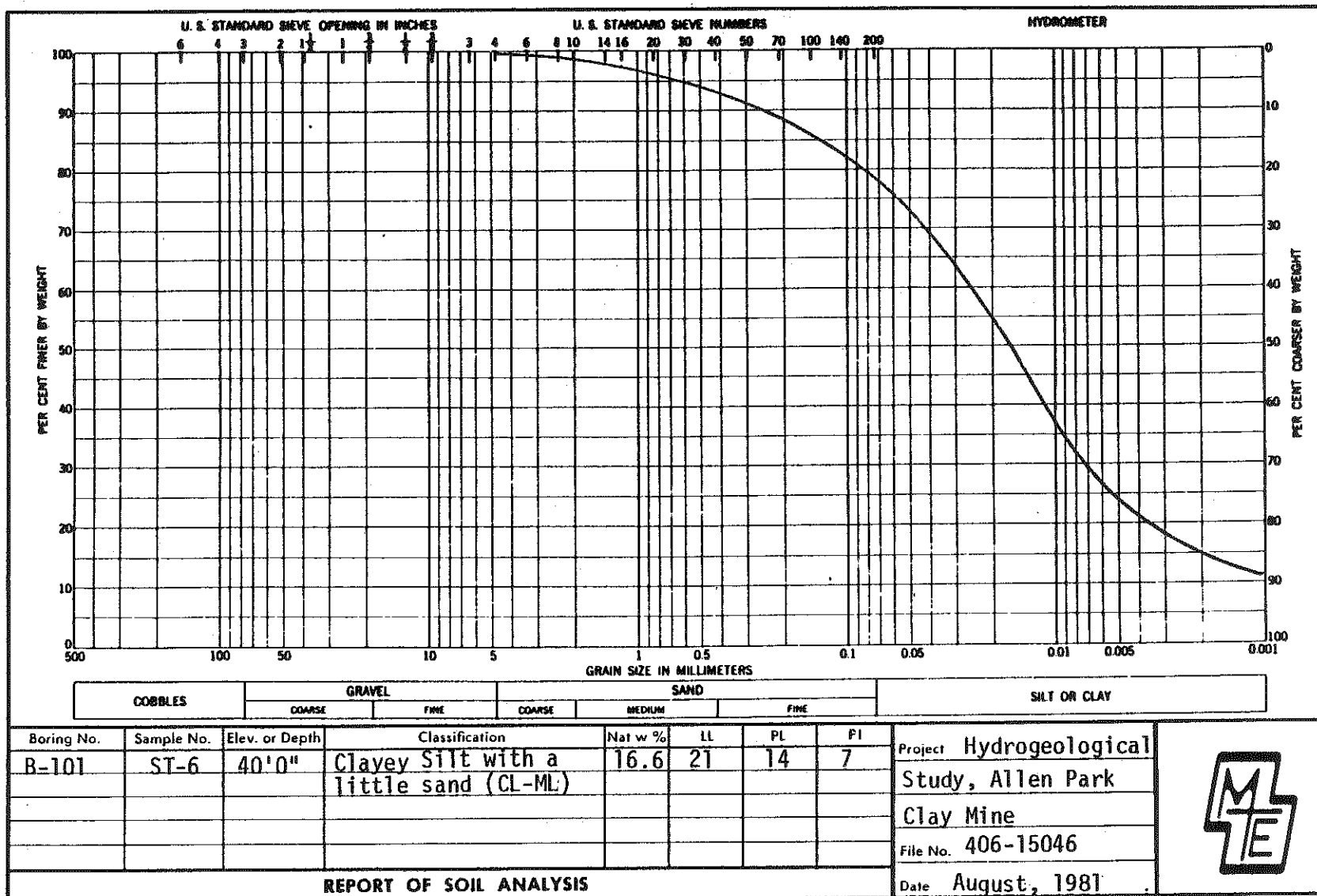
Additionally, it is recommended that samples of the hazardous waste leachate be analyzed for the same parameters as outlined above for ground water samples for purposes of comparison.

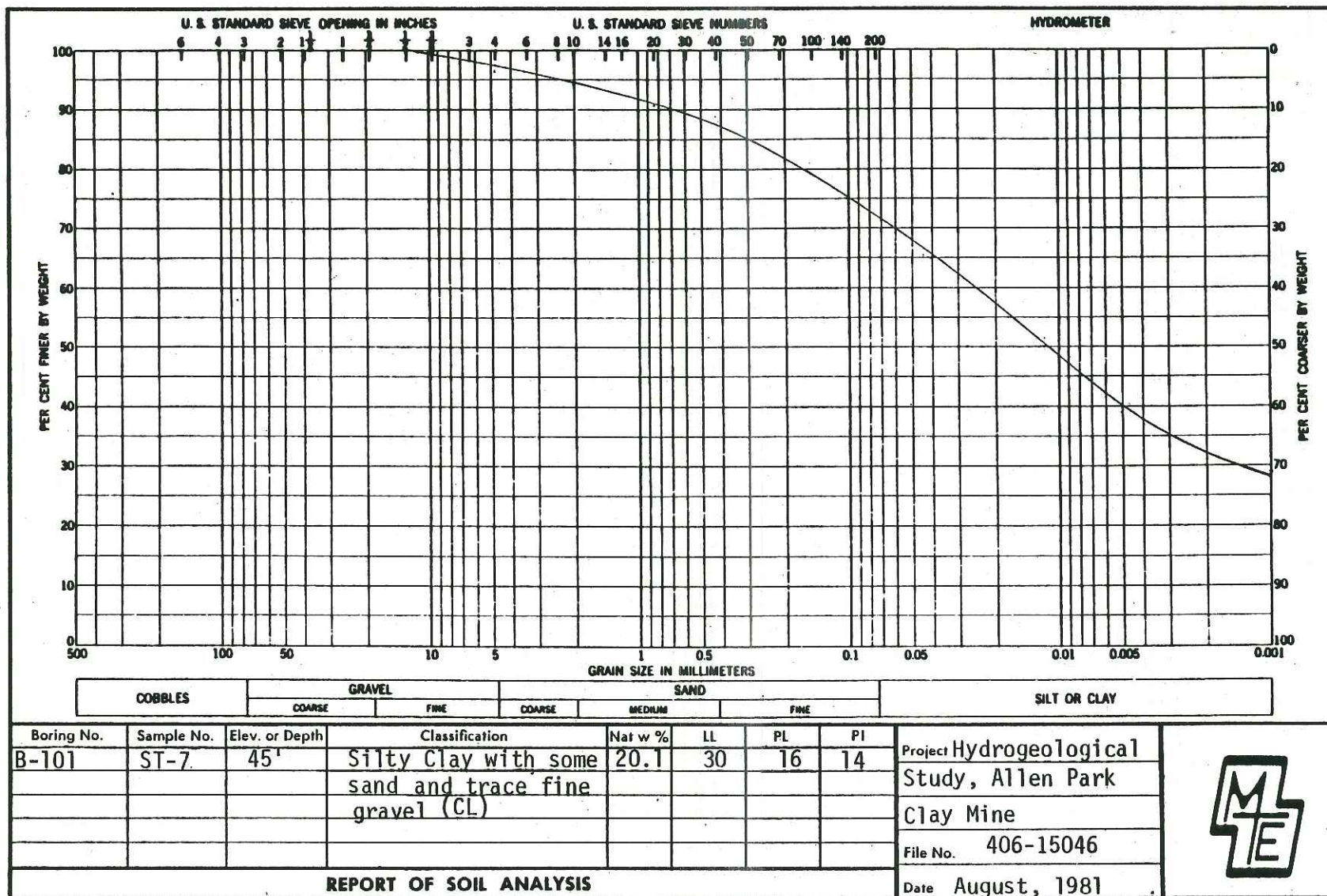
APPENDIX A
CURRENT LABORATORY TEST RESULTS
GRAIN SIZE PLOTS

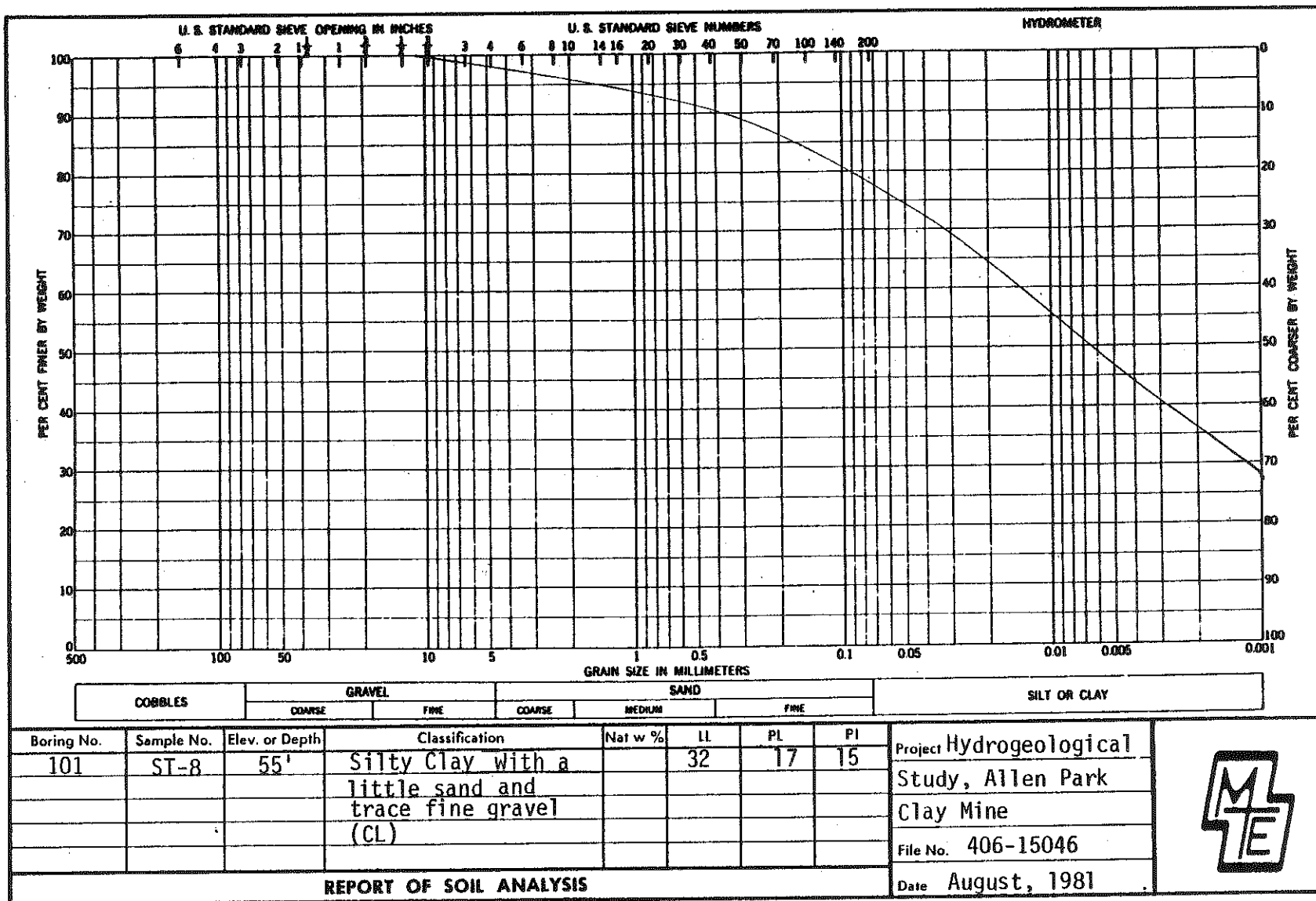


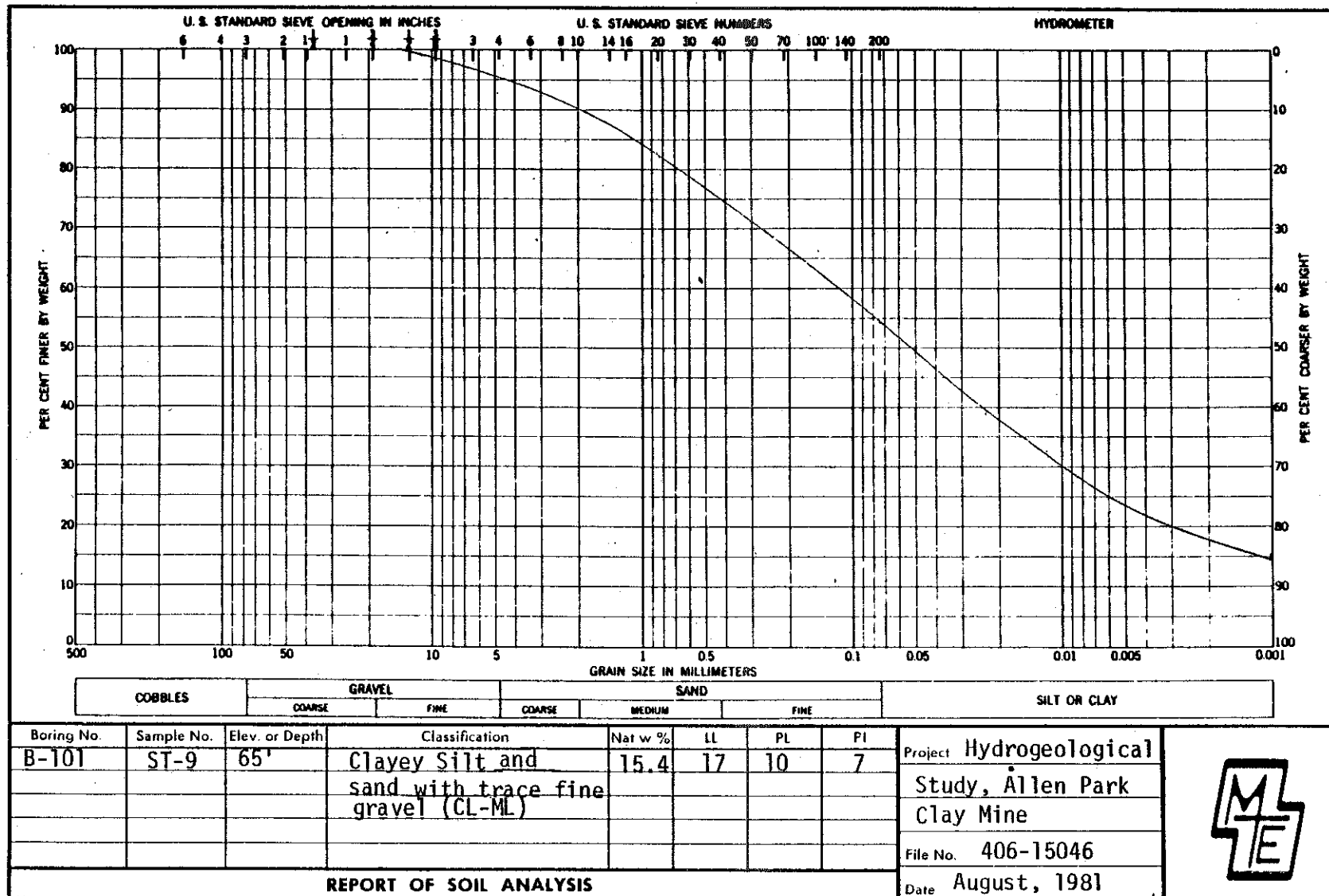


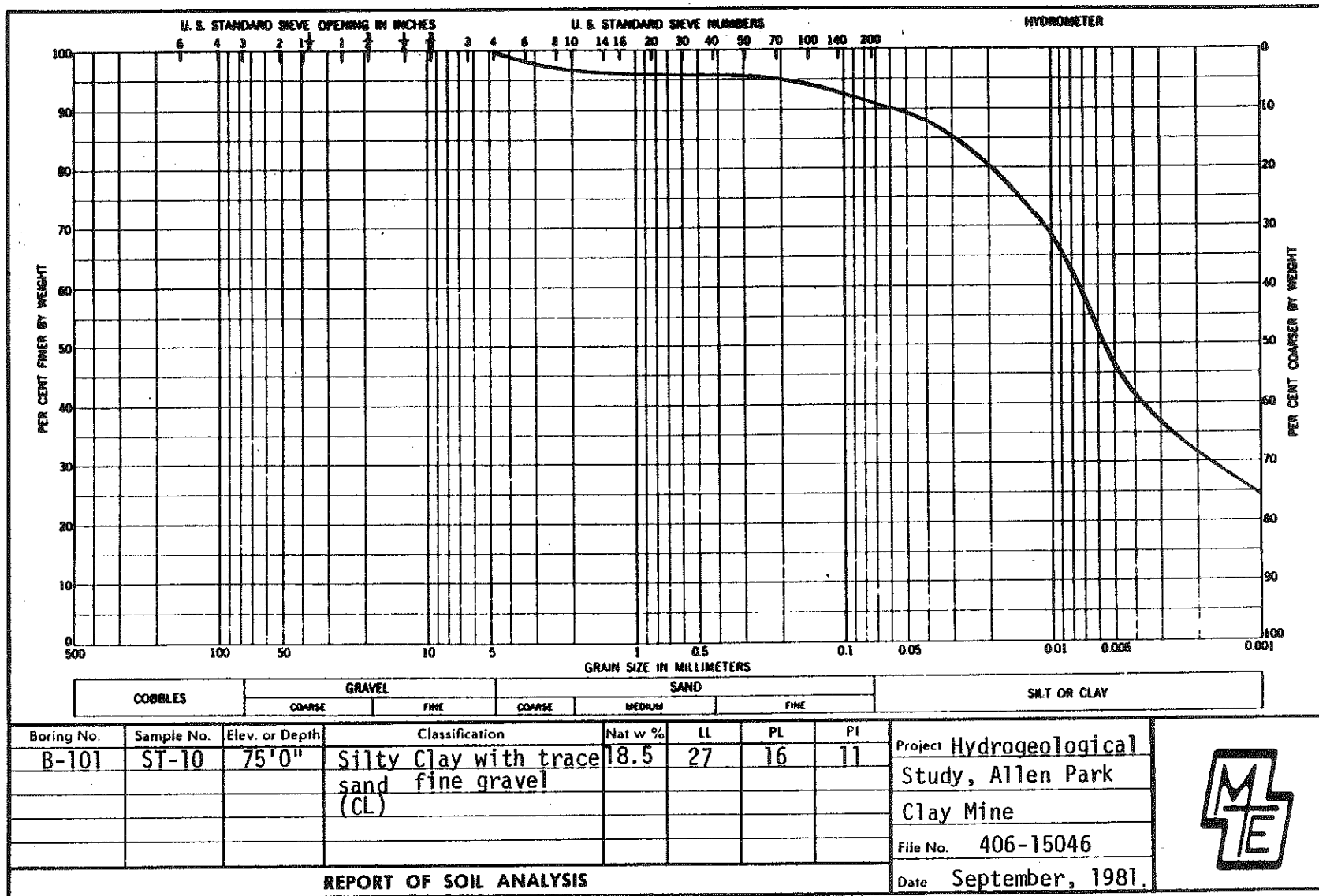


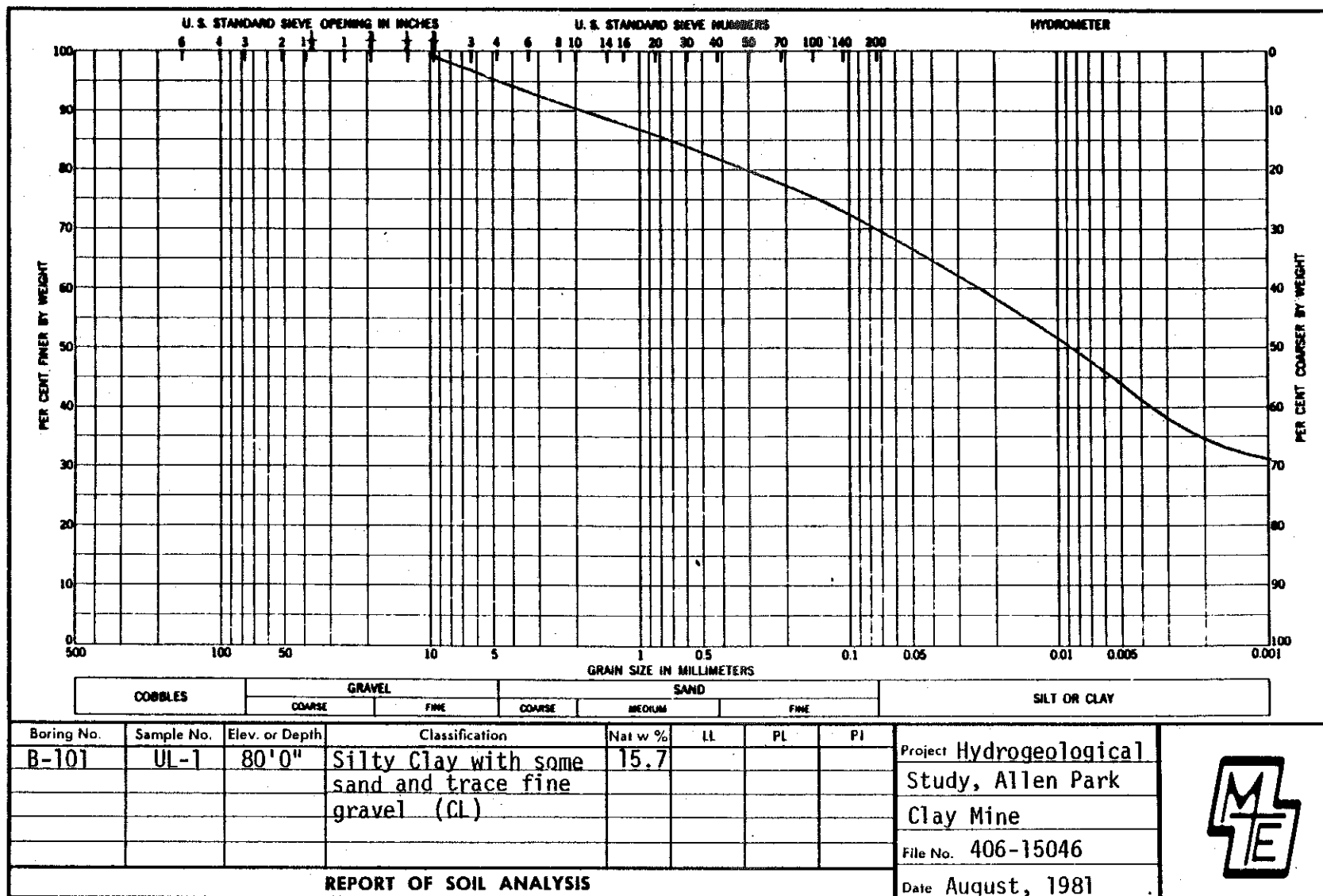


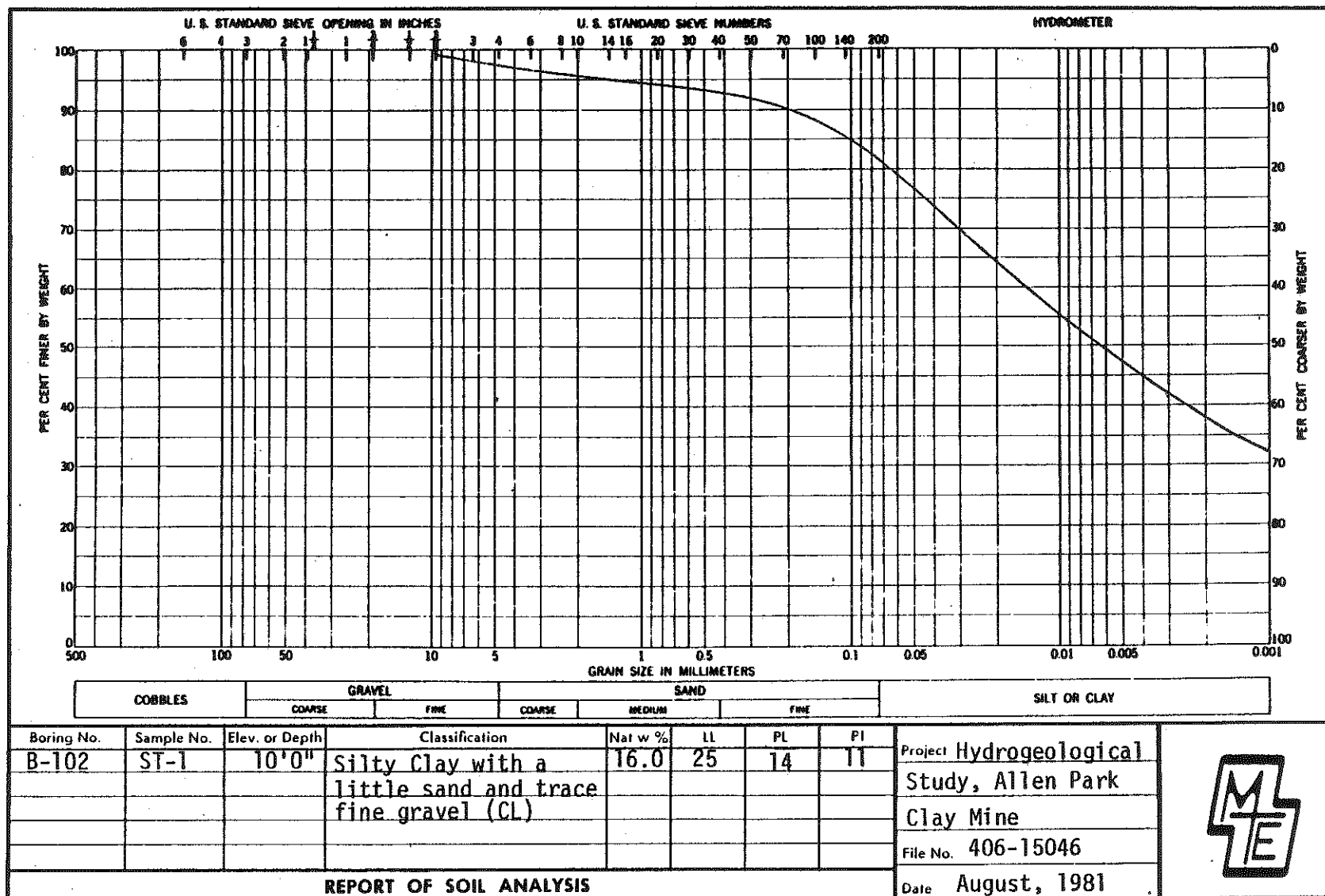




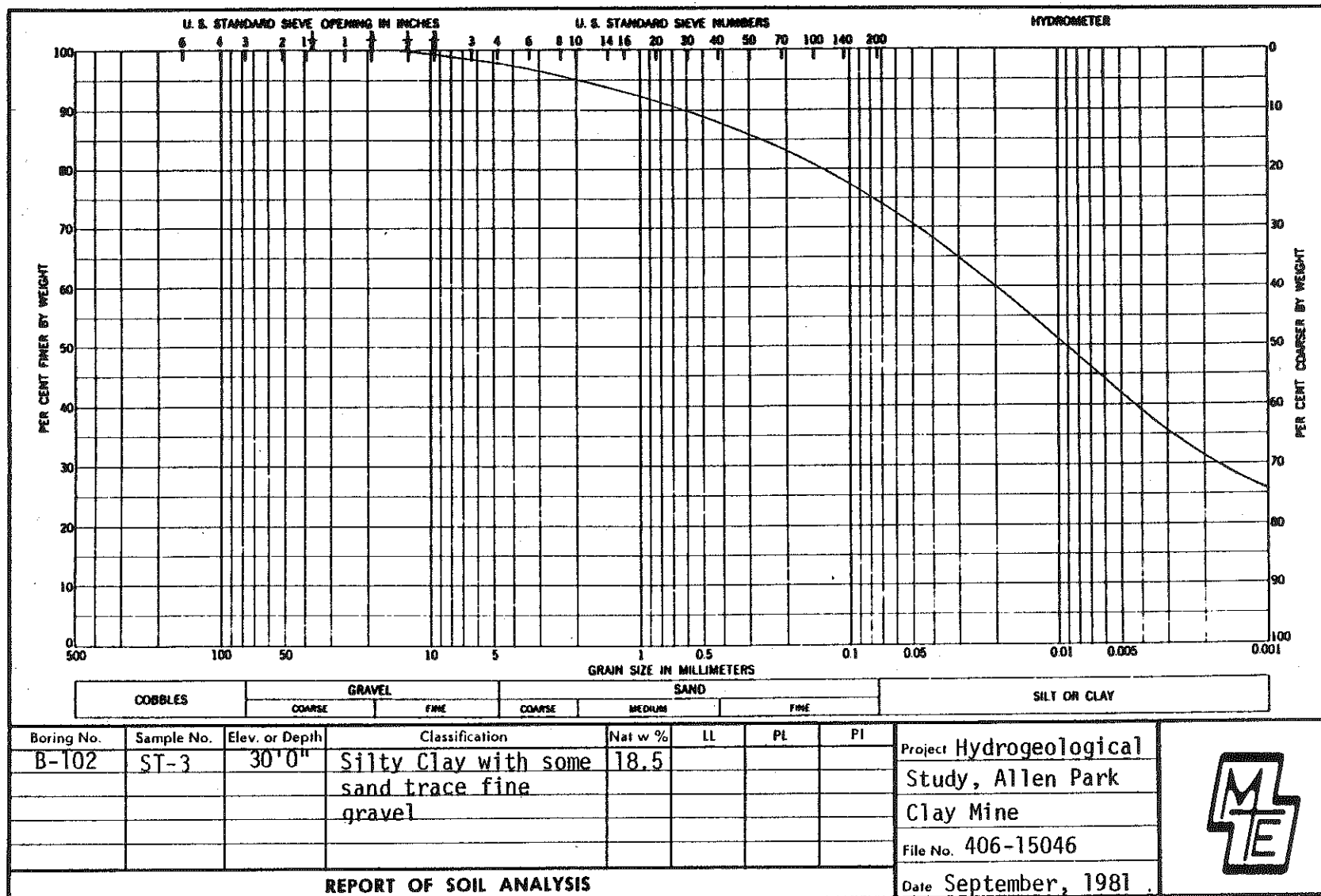


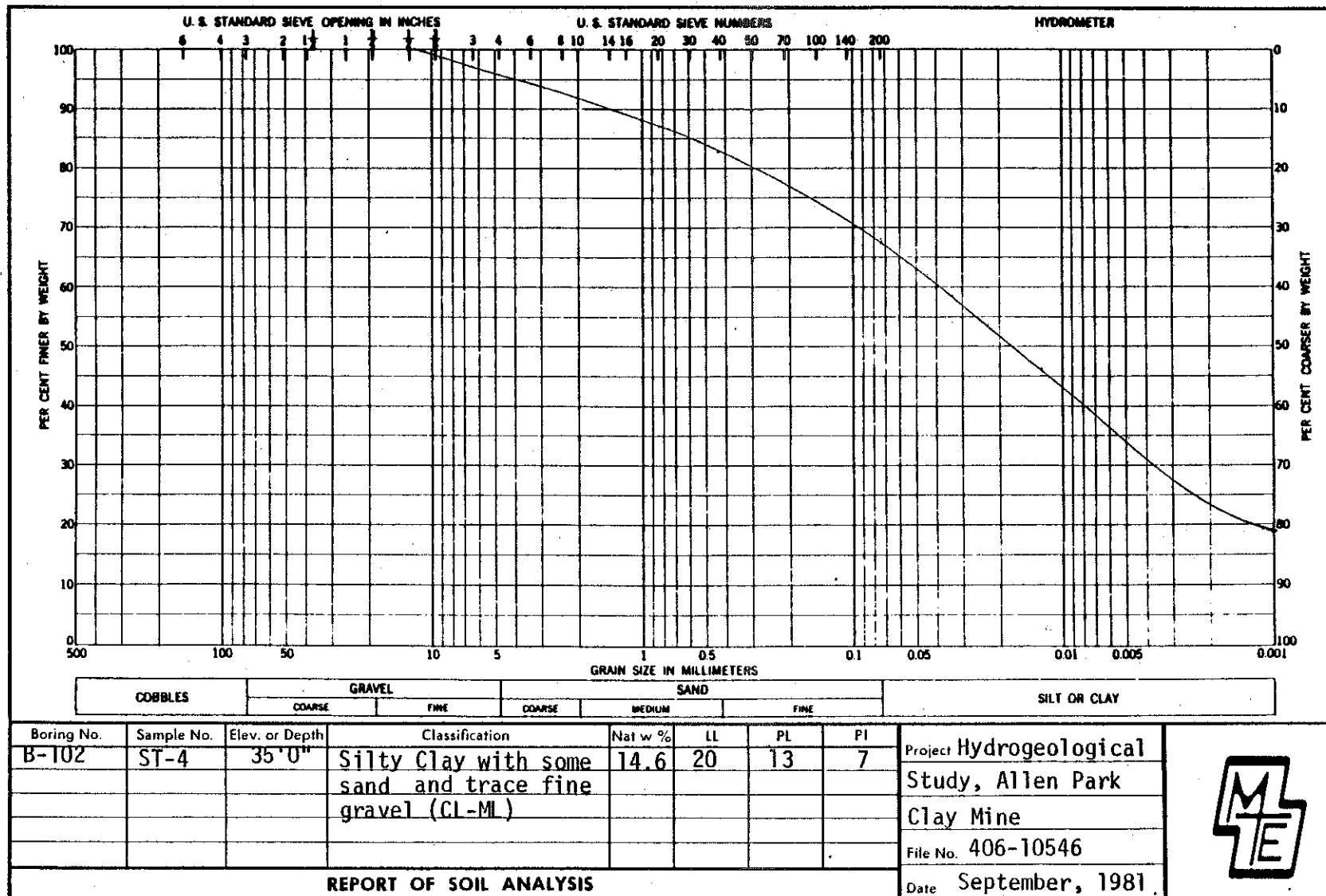


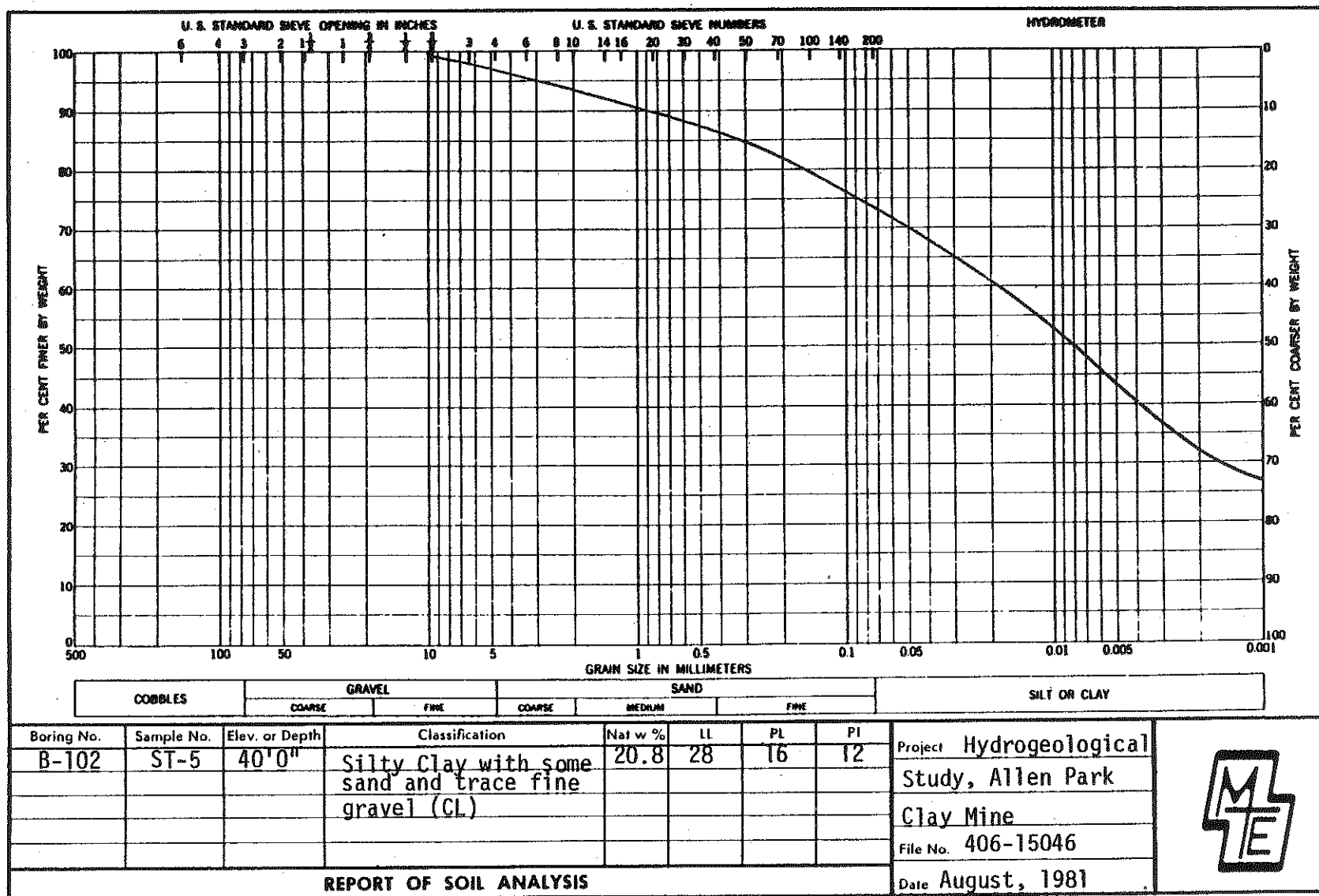


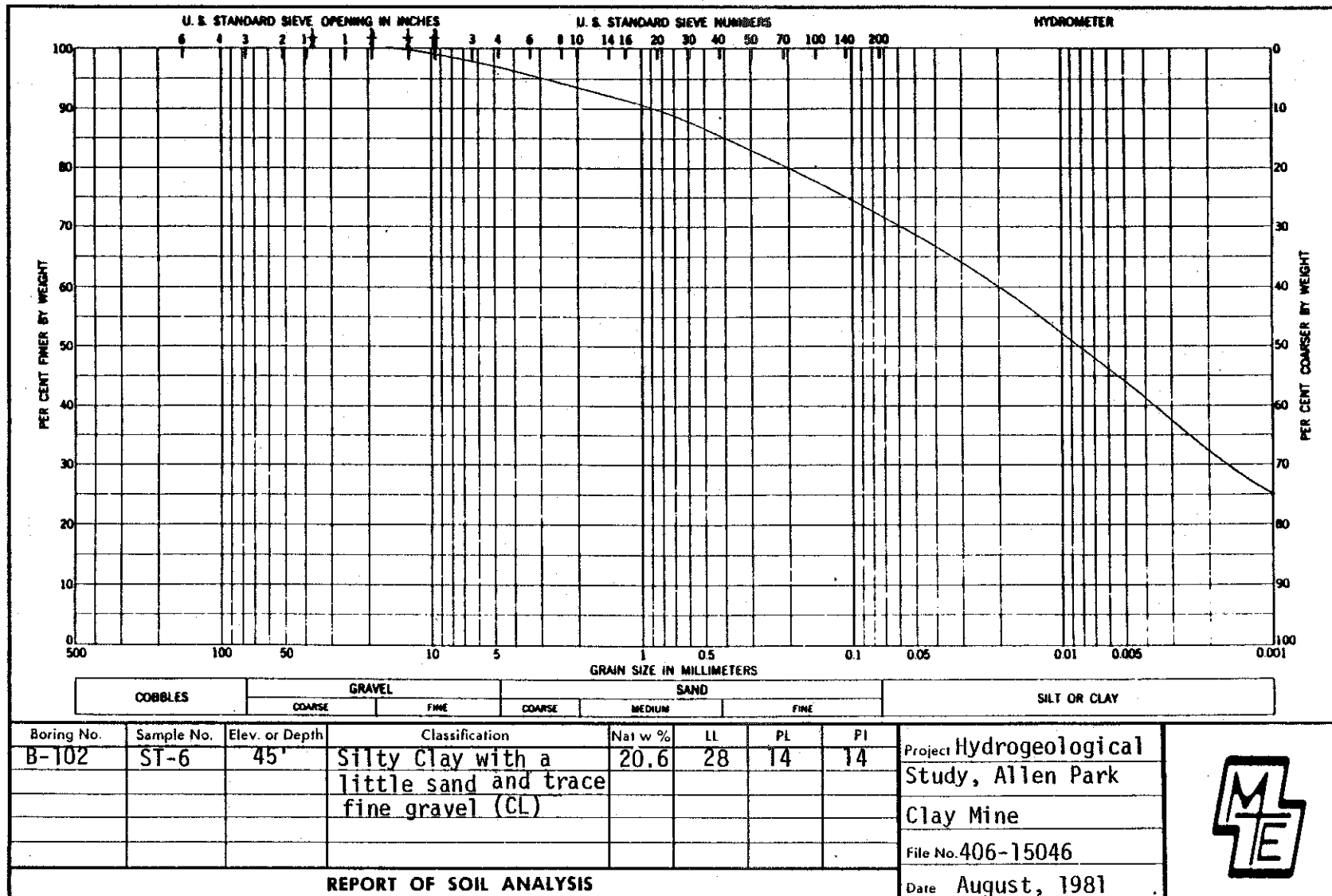


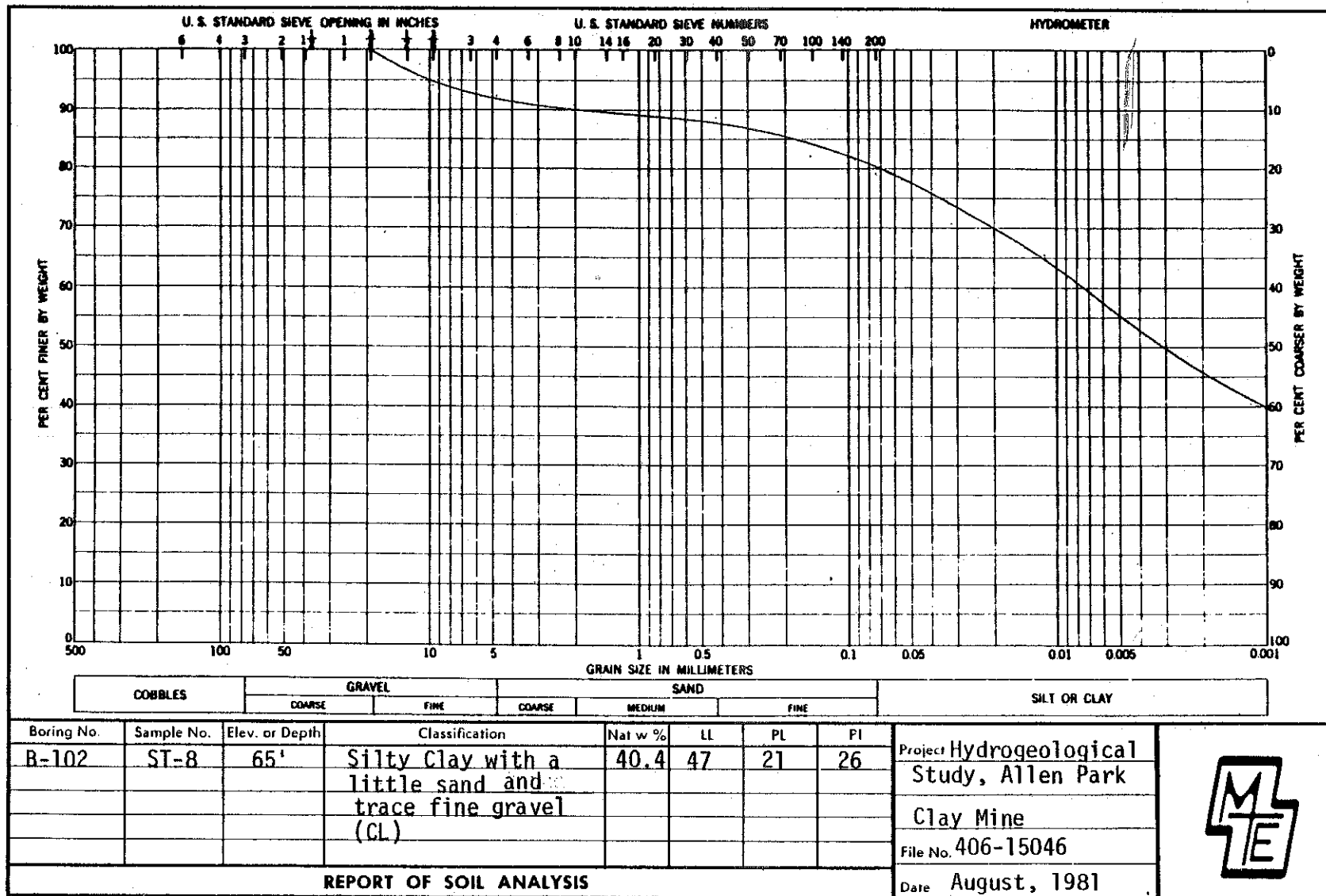


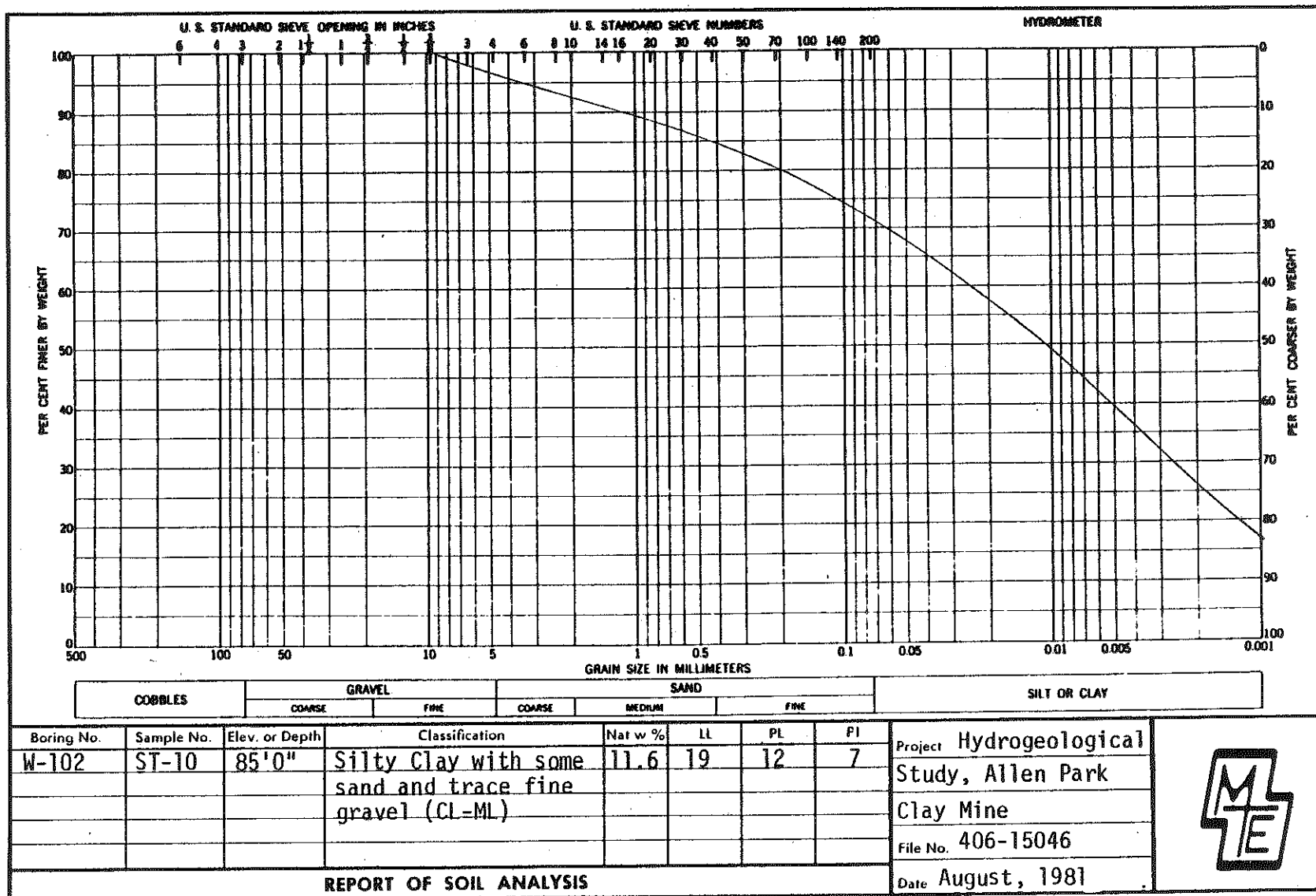


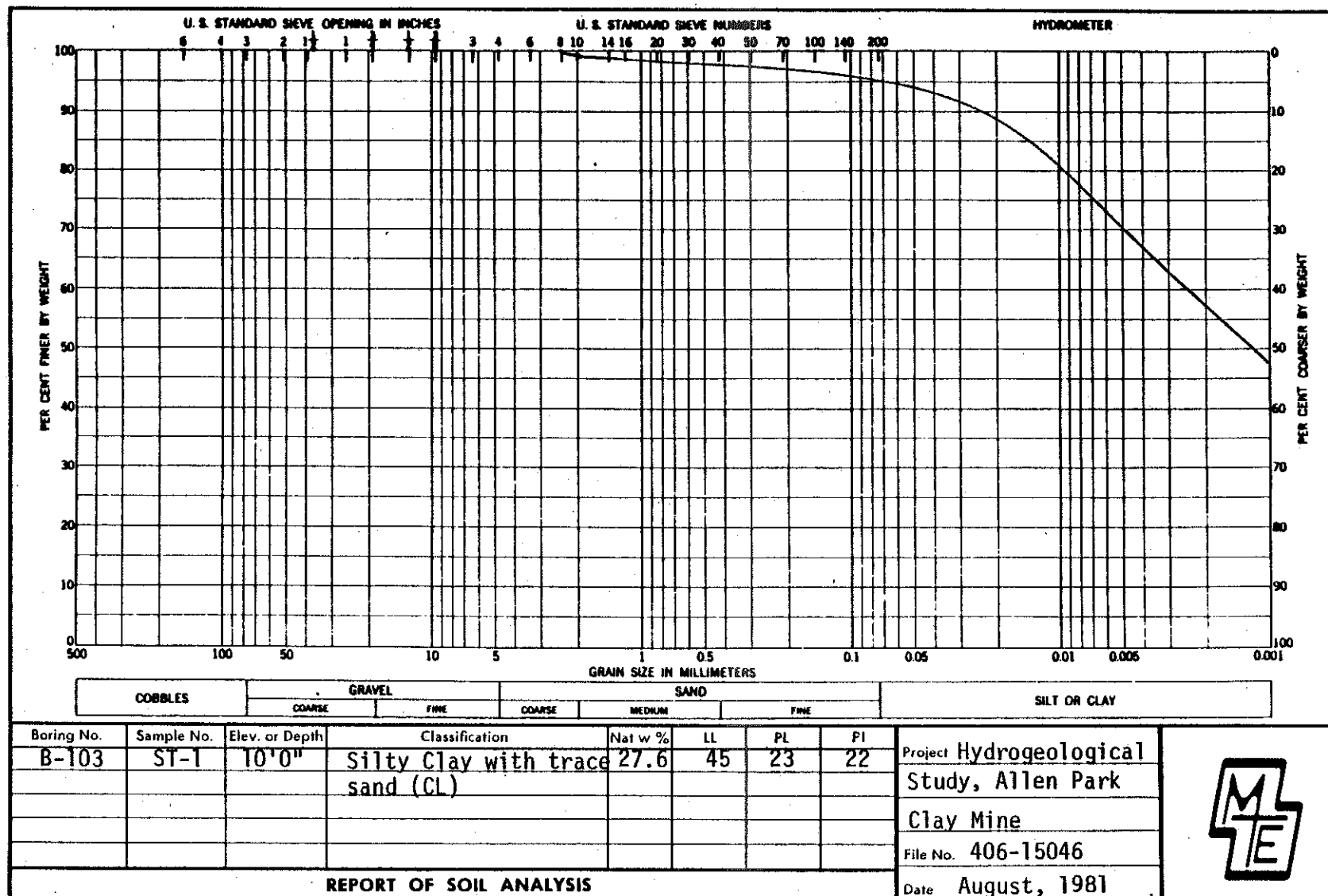


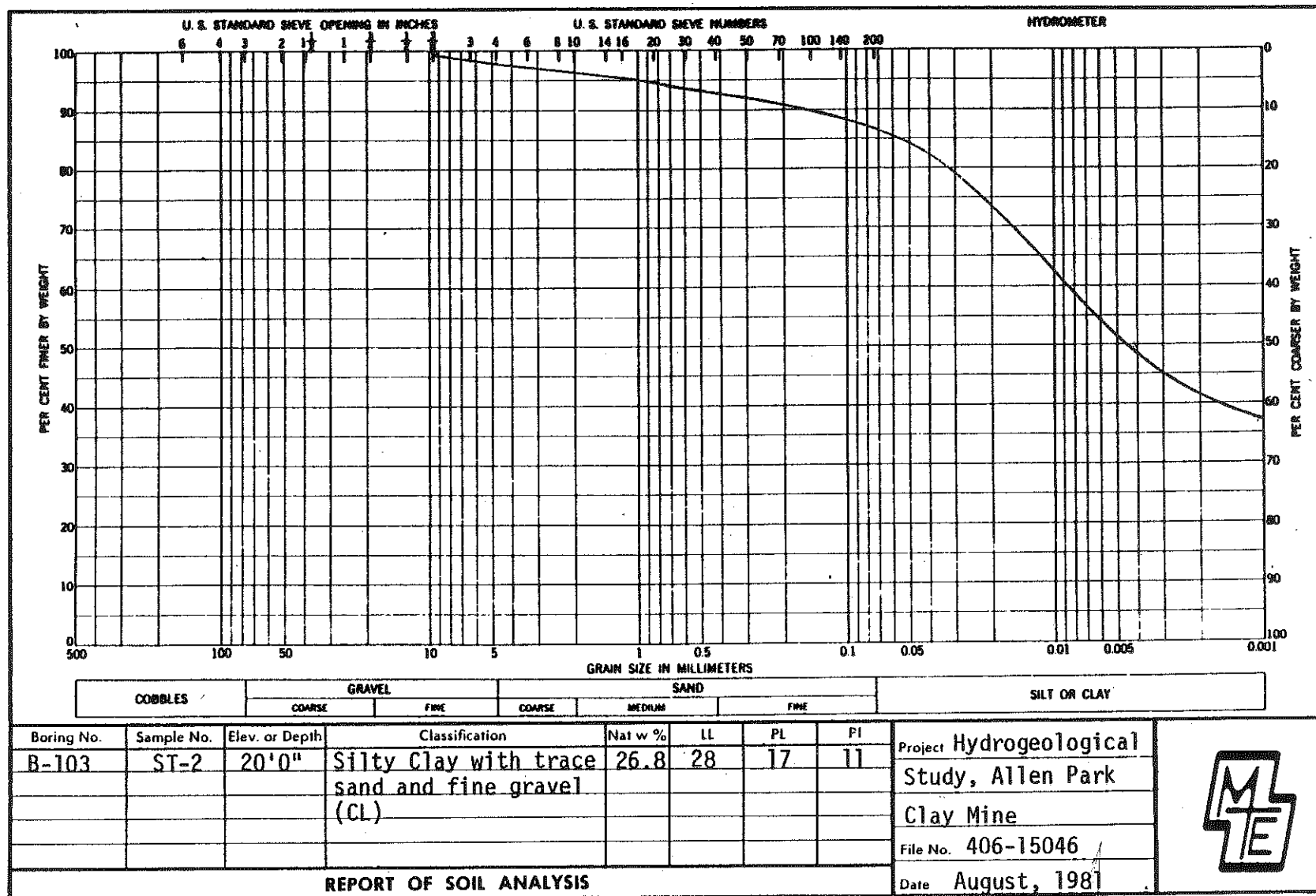


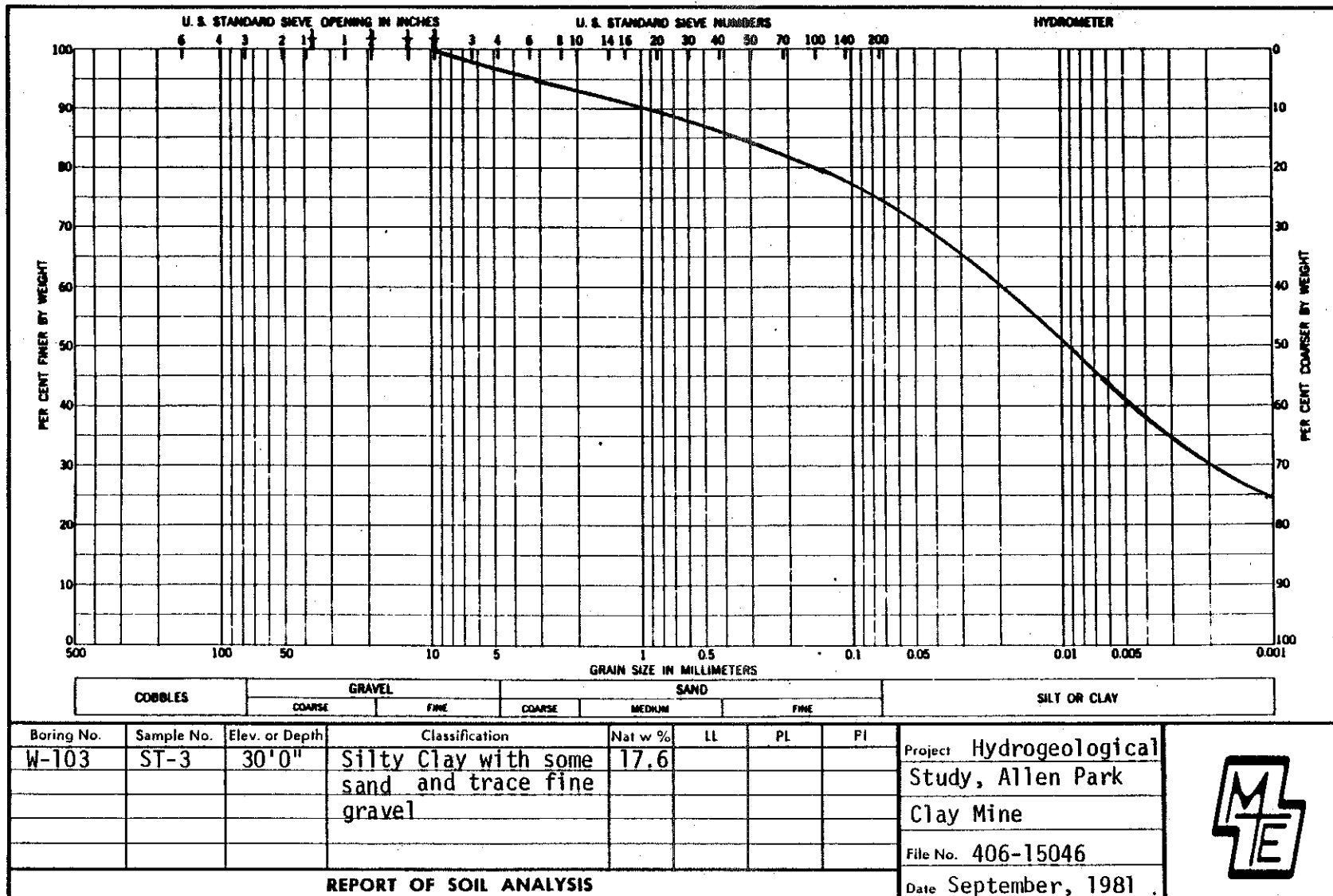


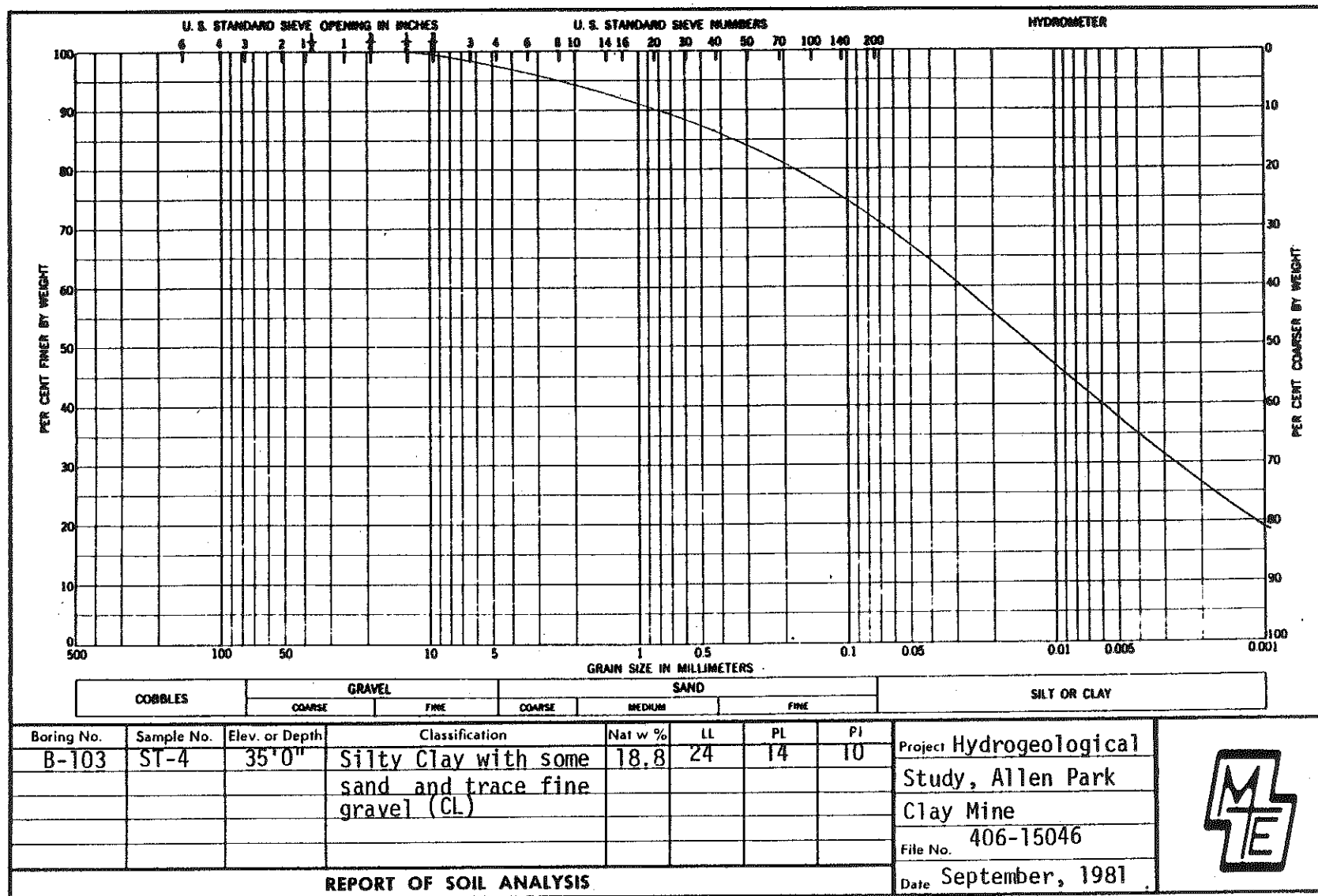


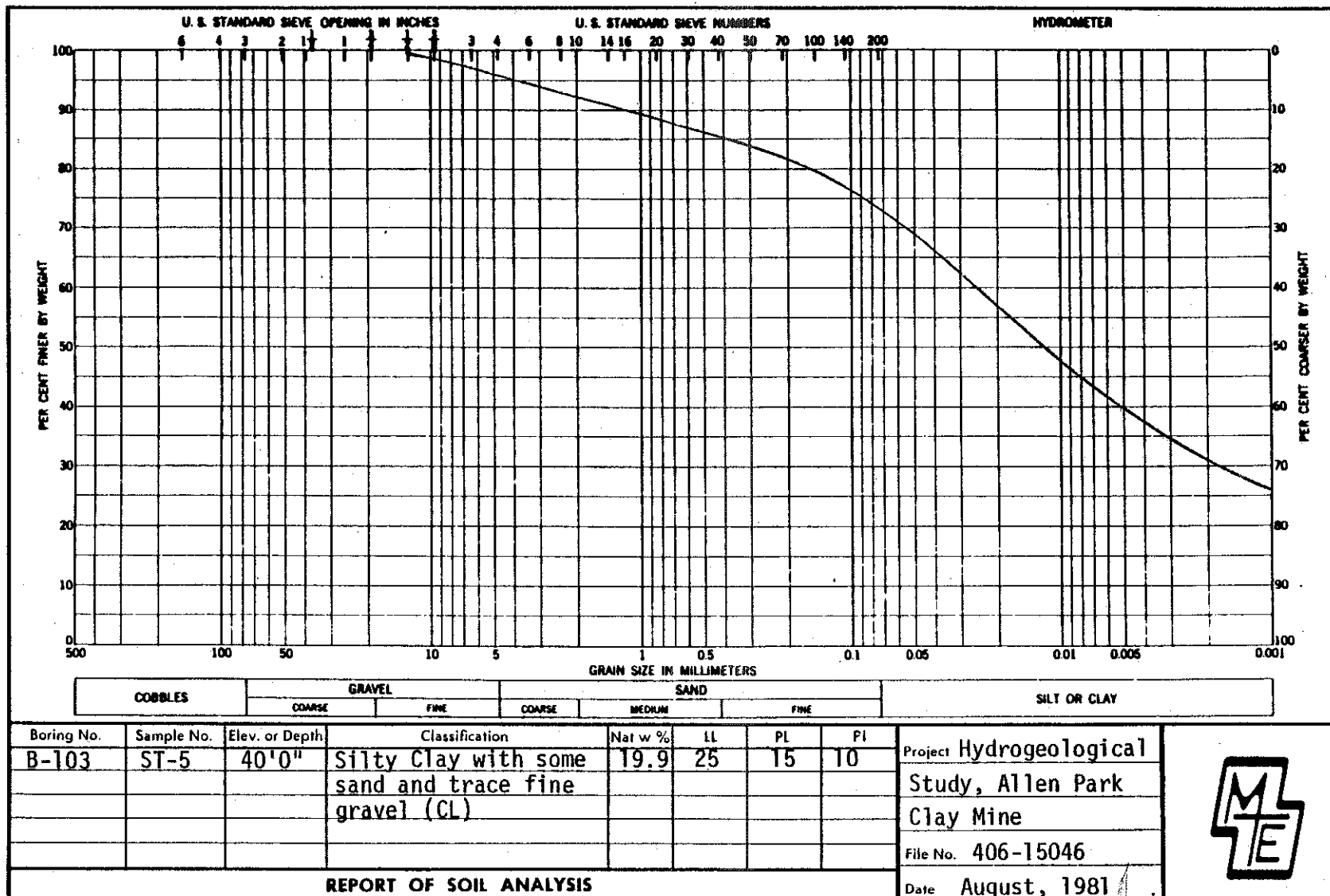


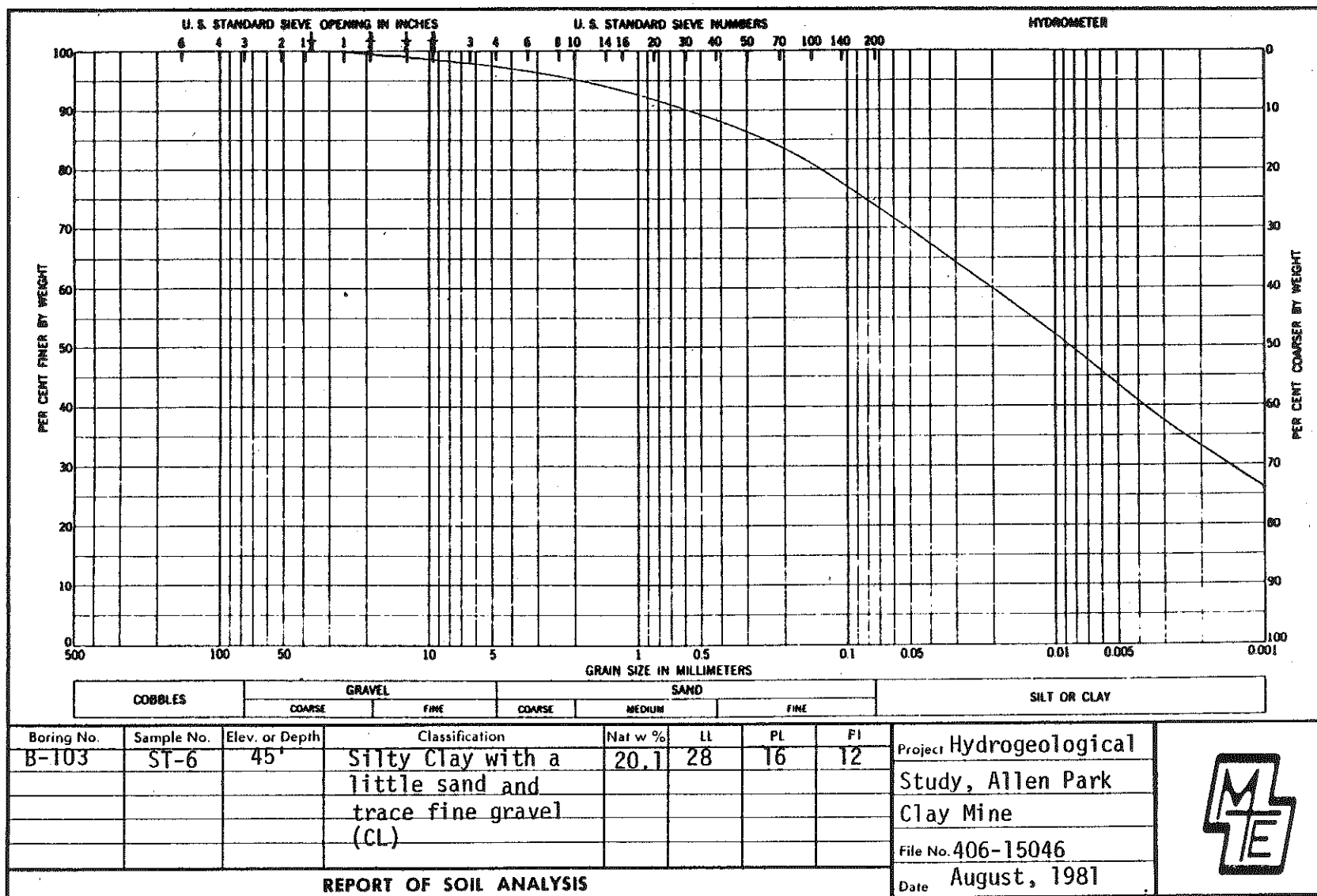


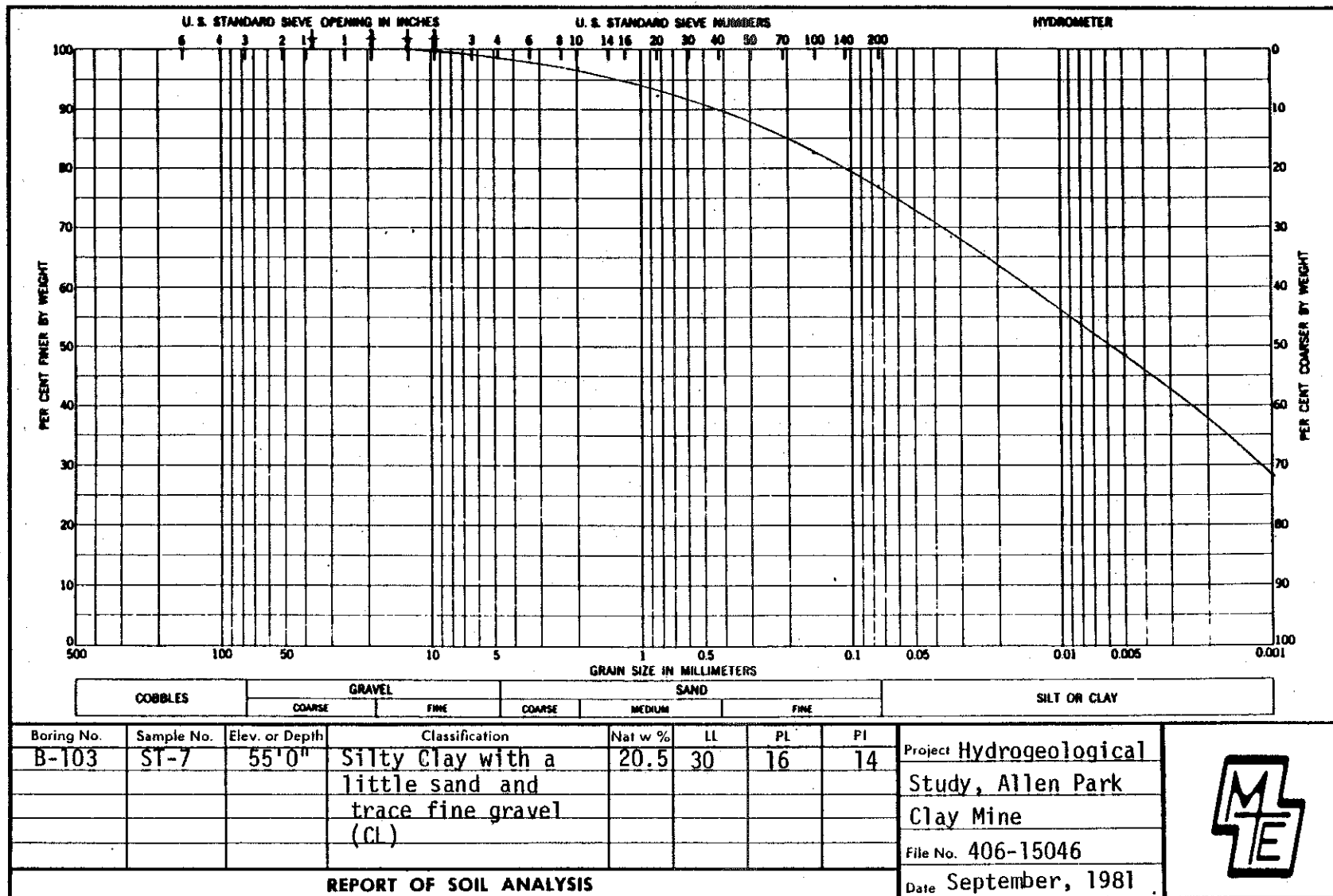


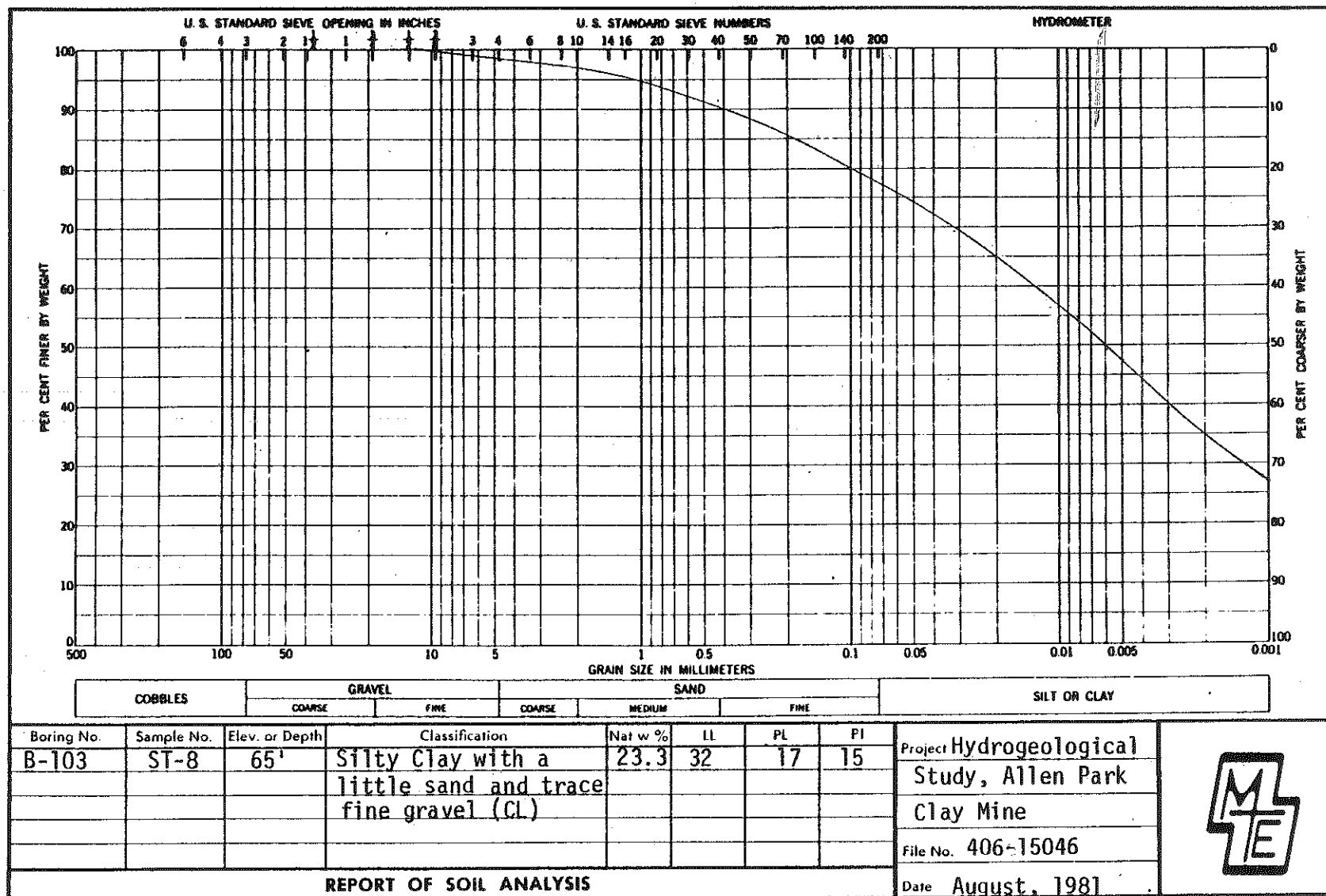


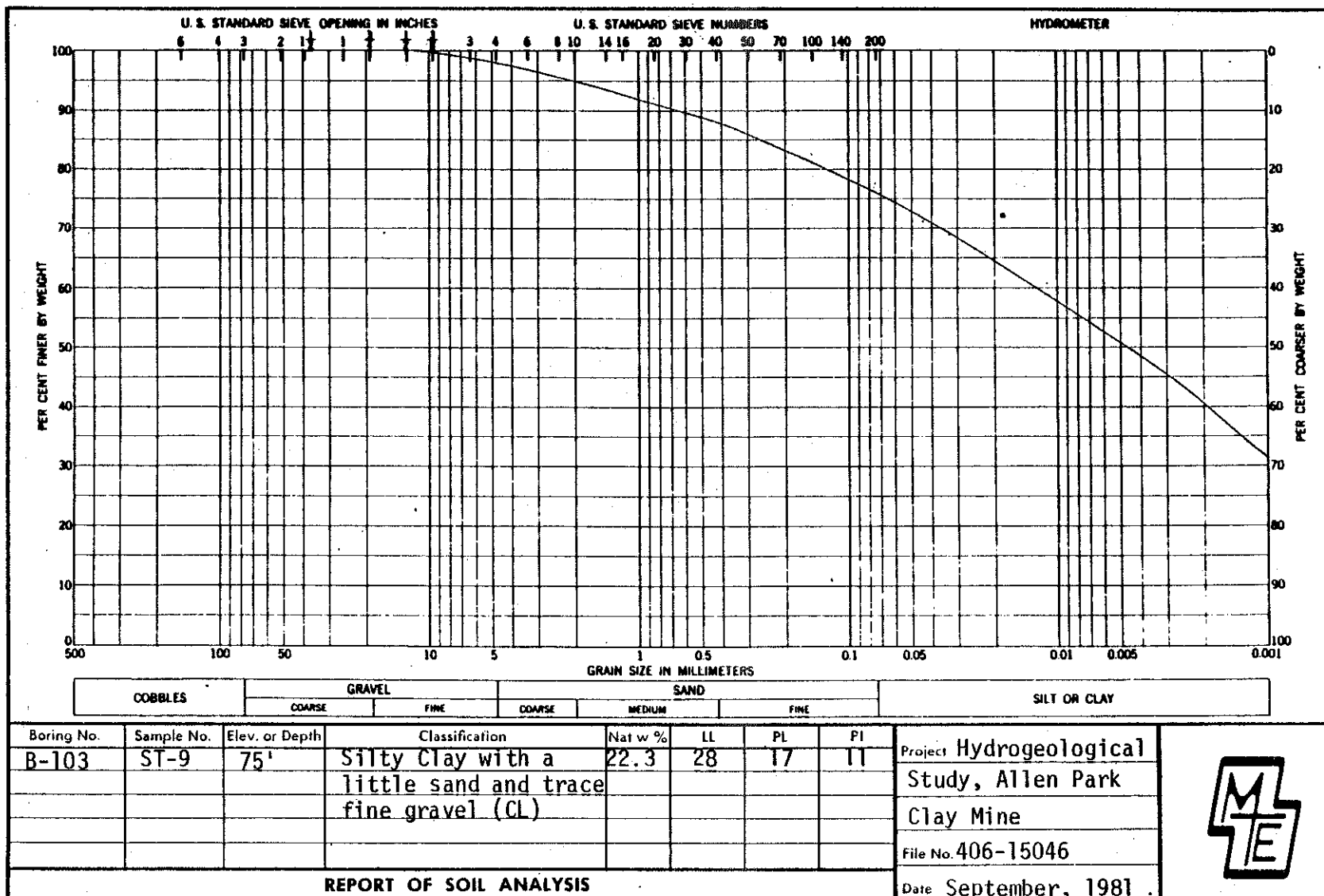


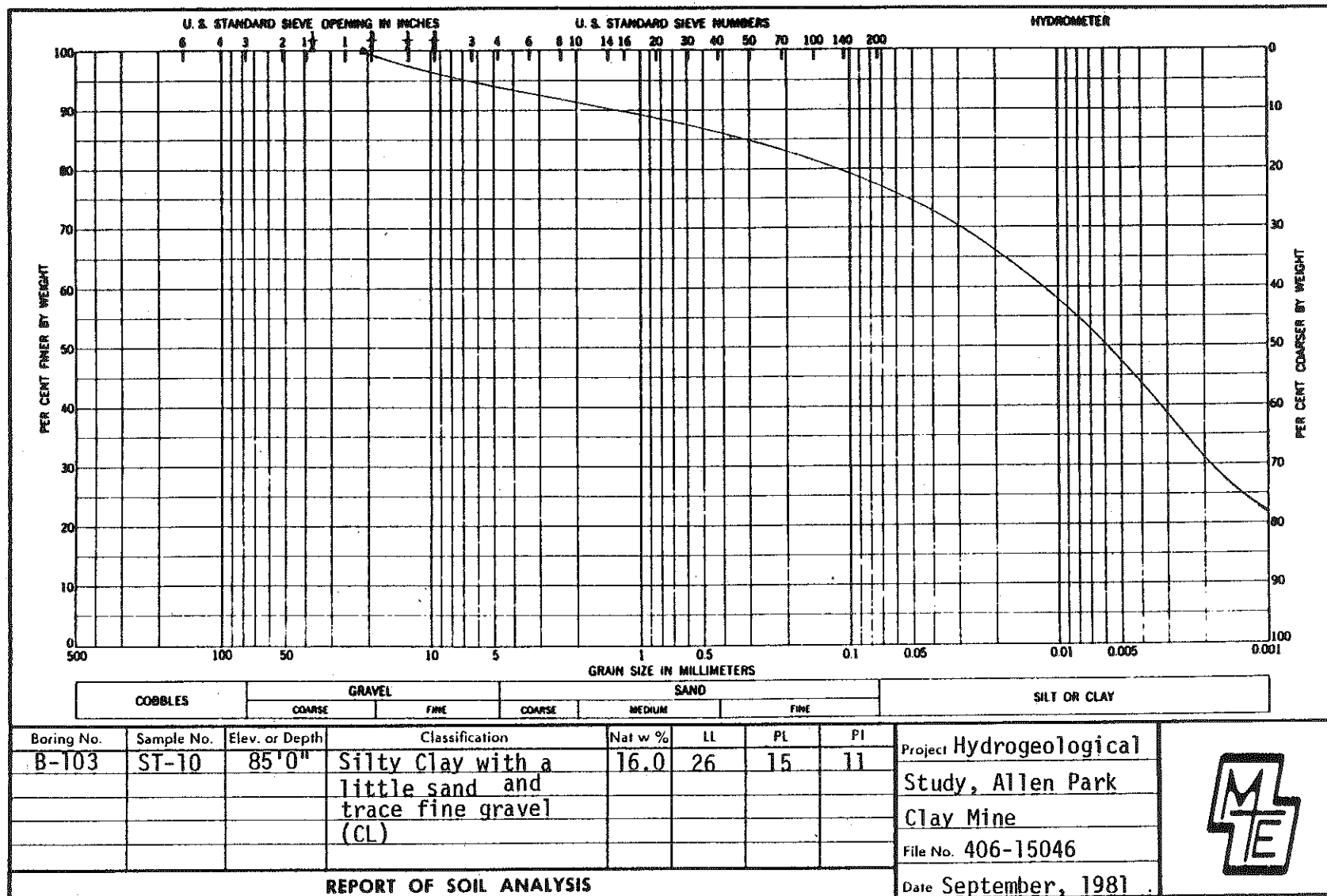


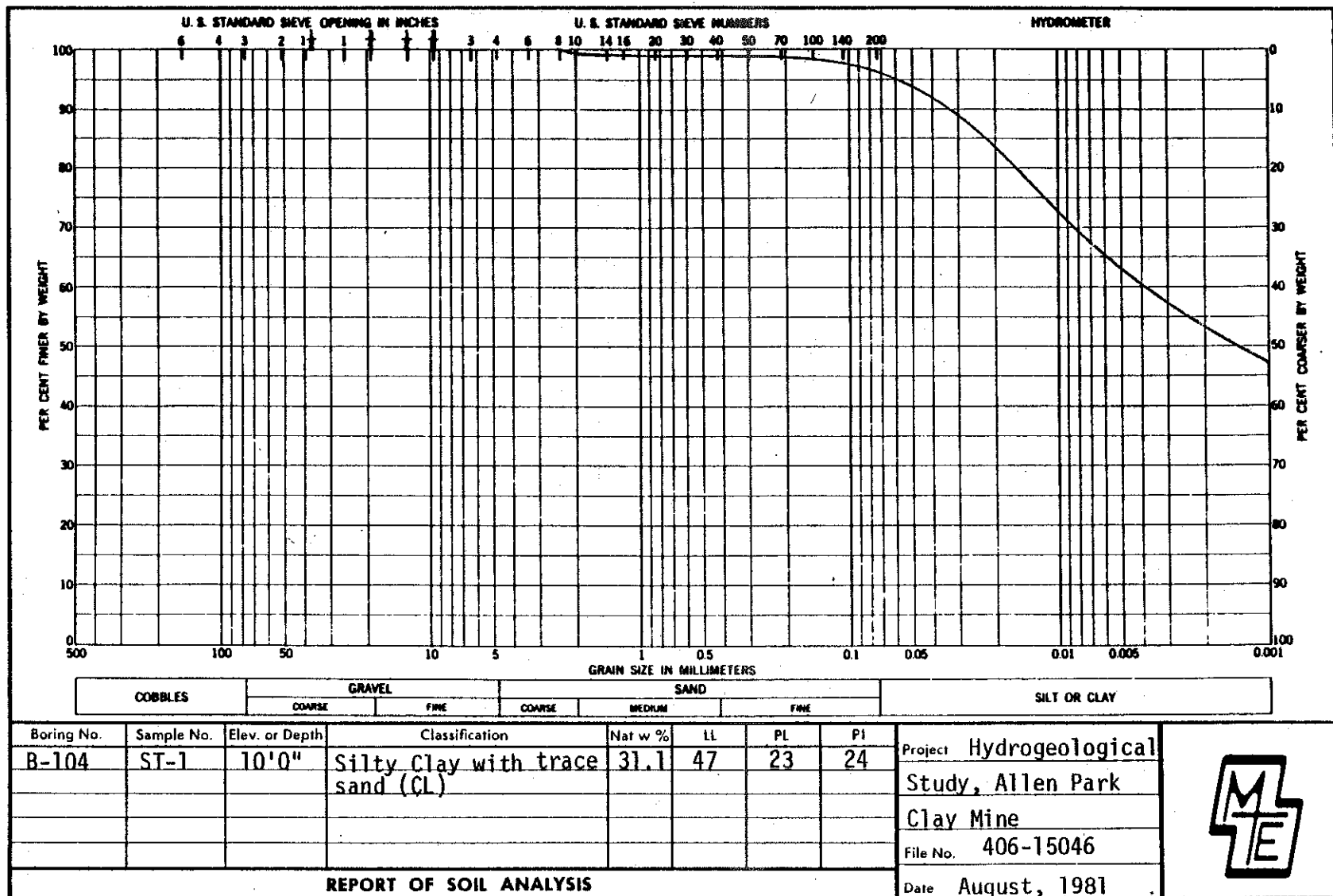


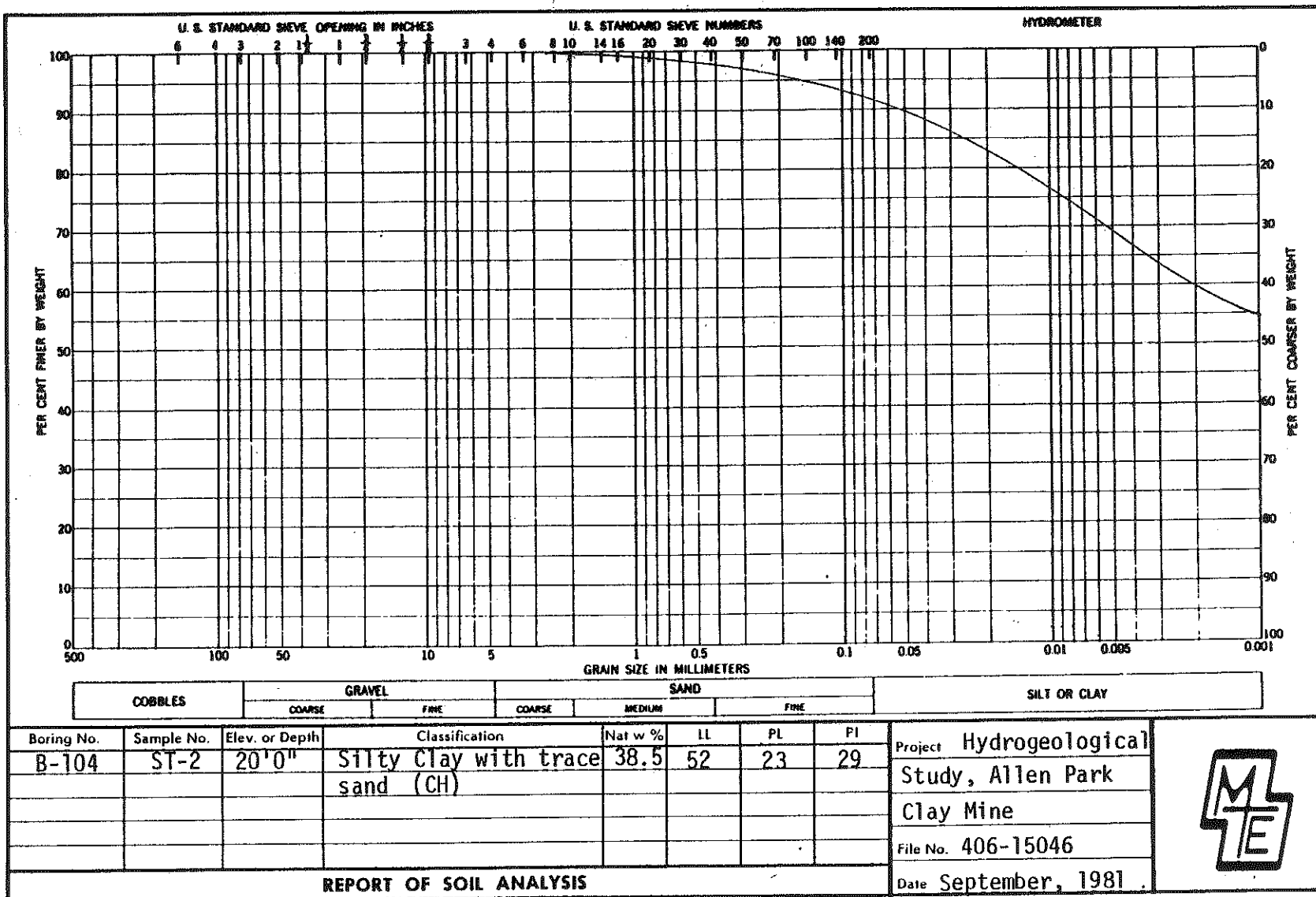


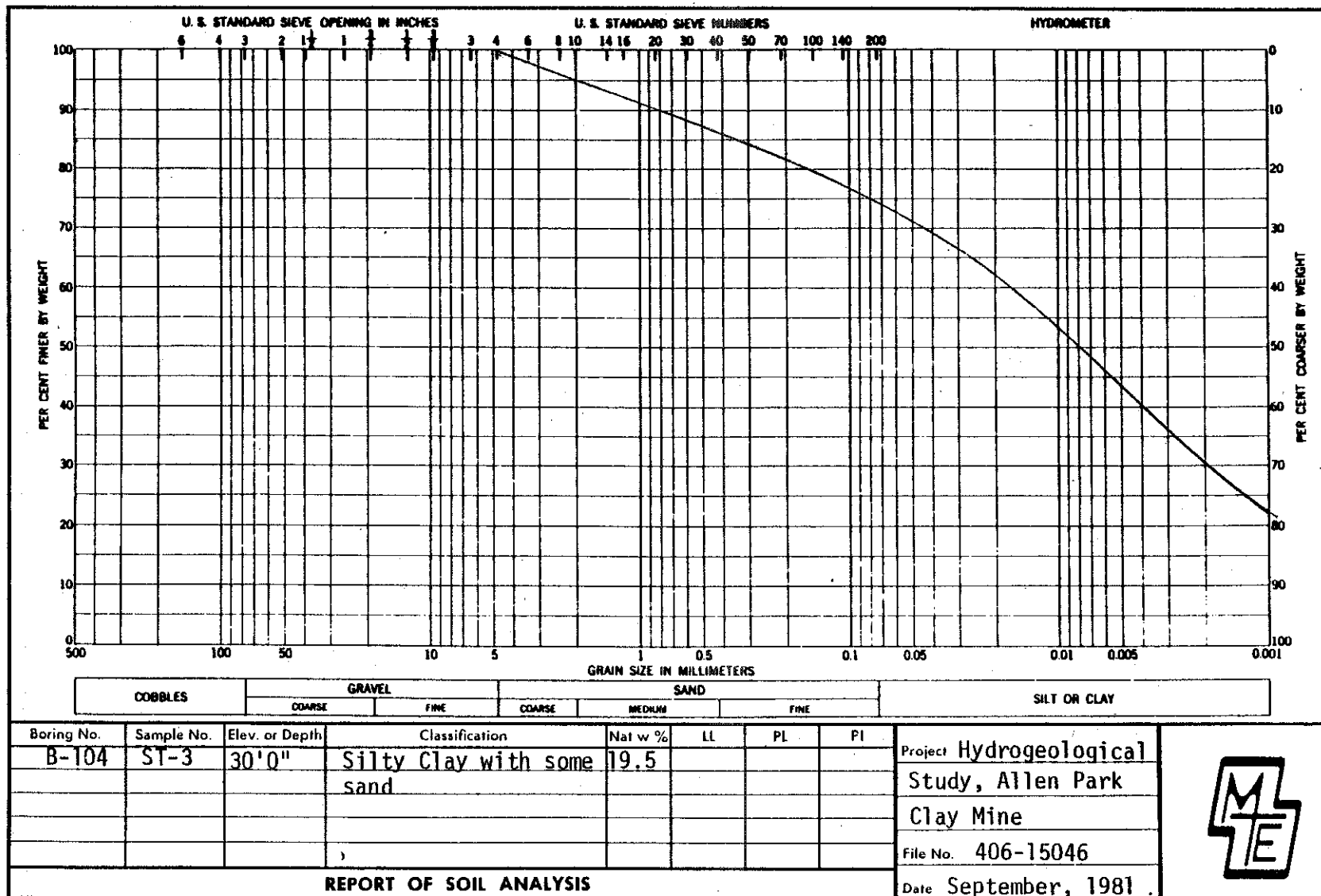


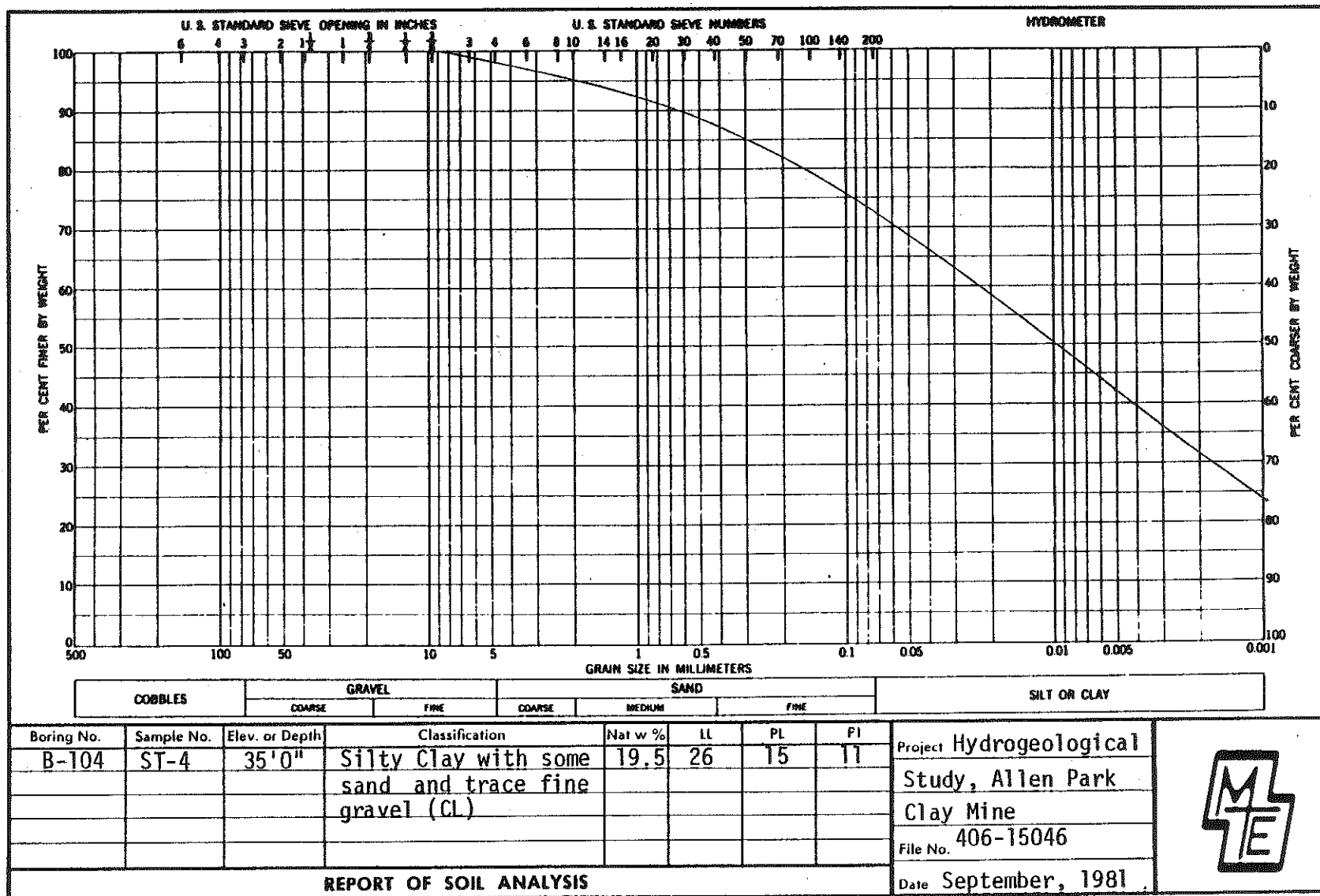


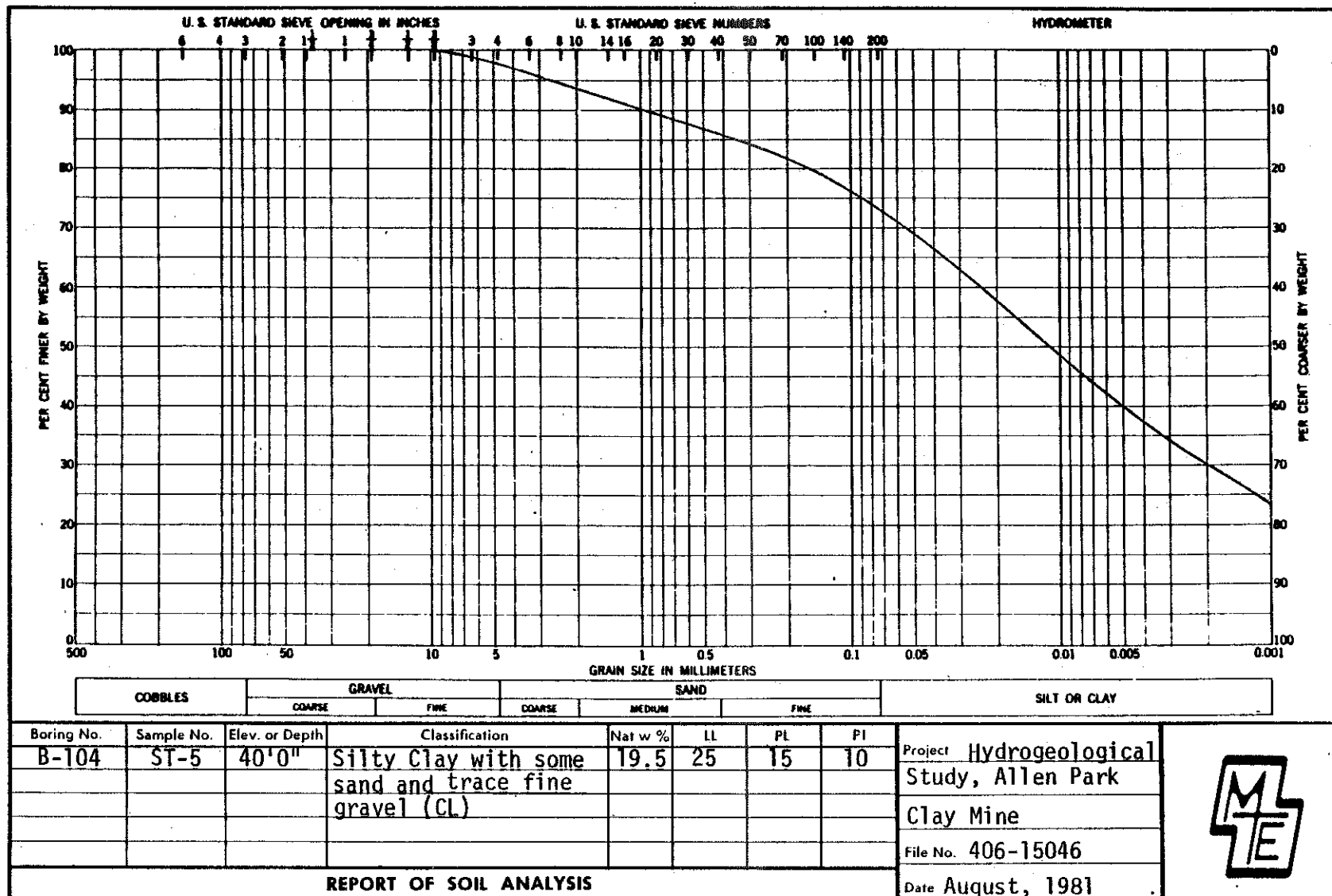


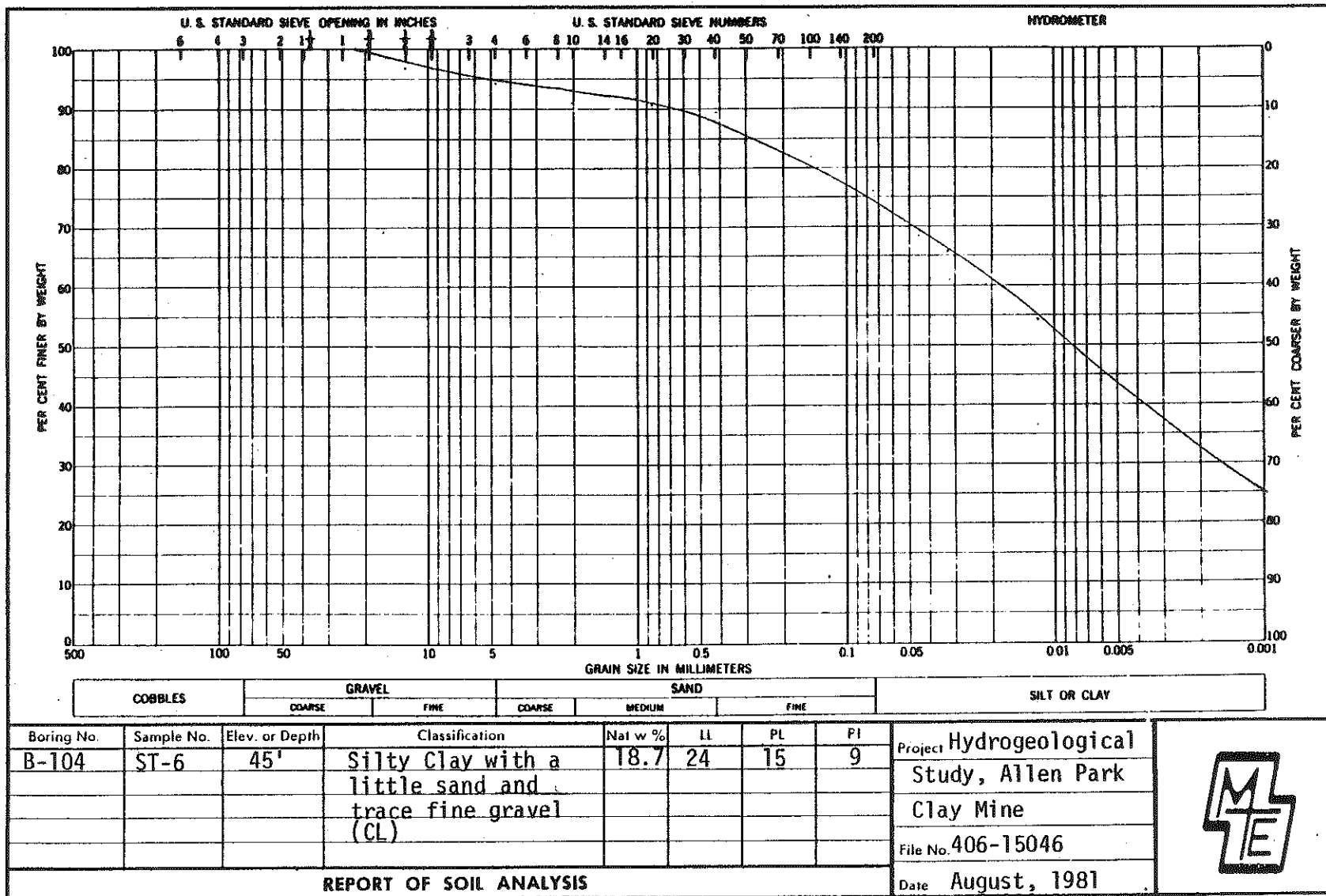


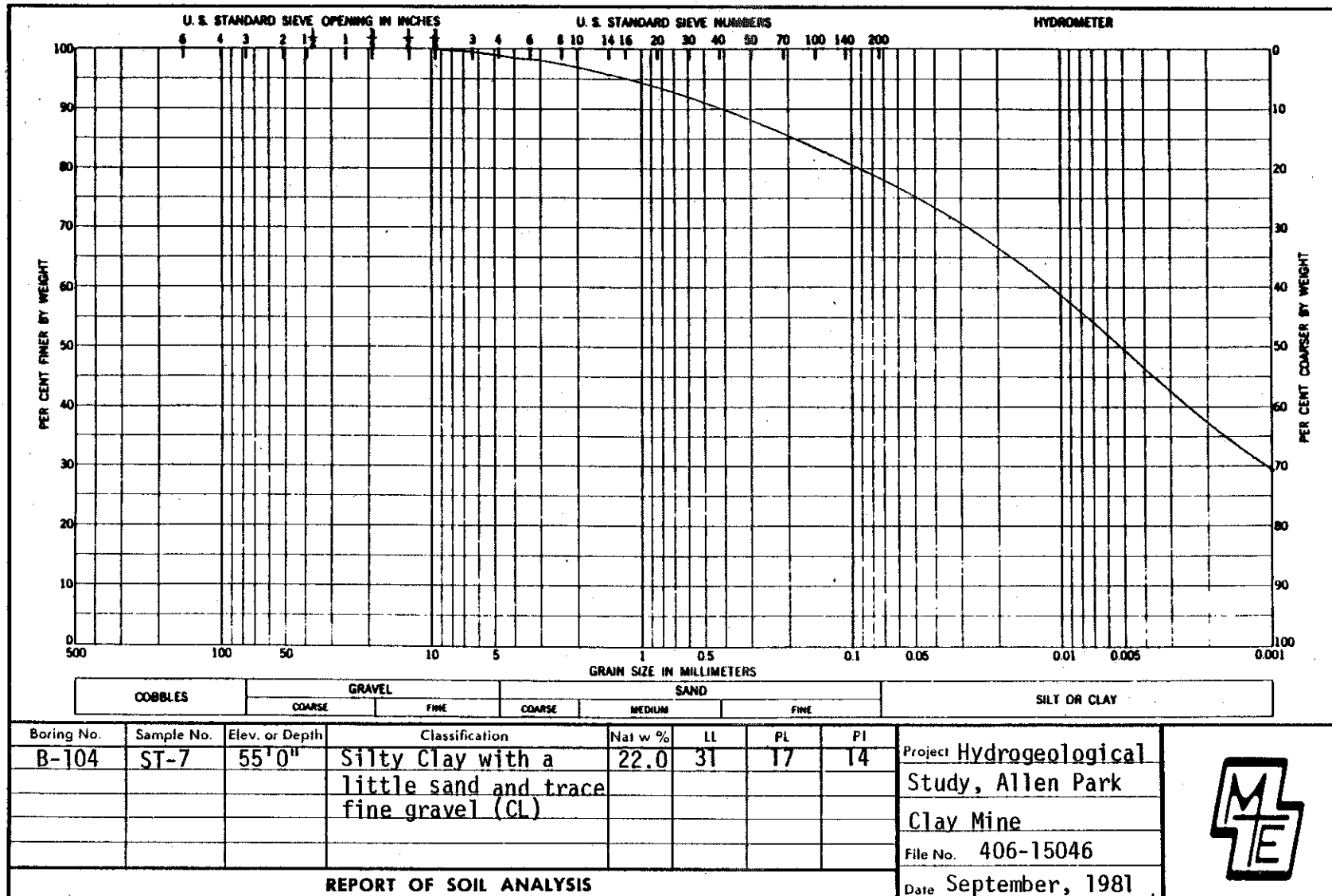


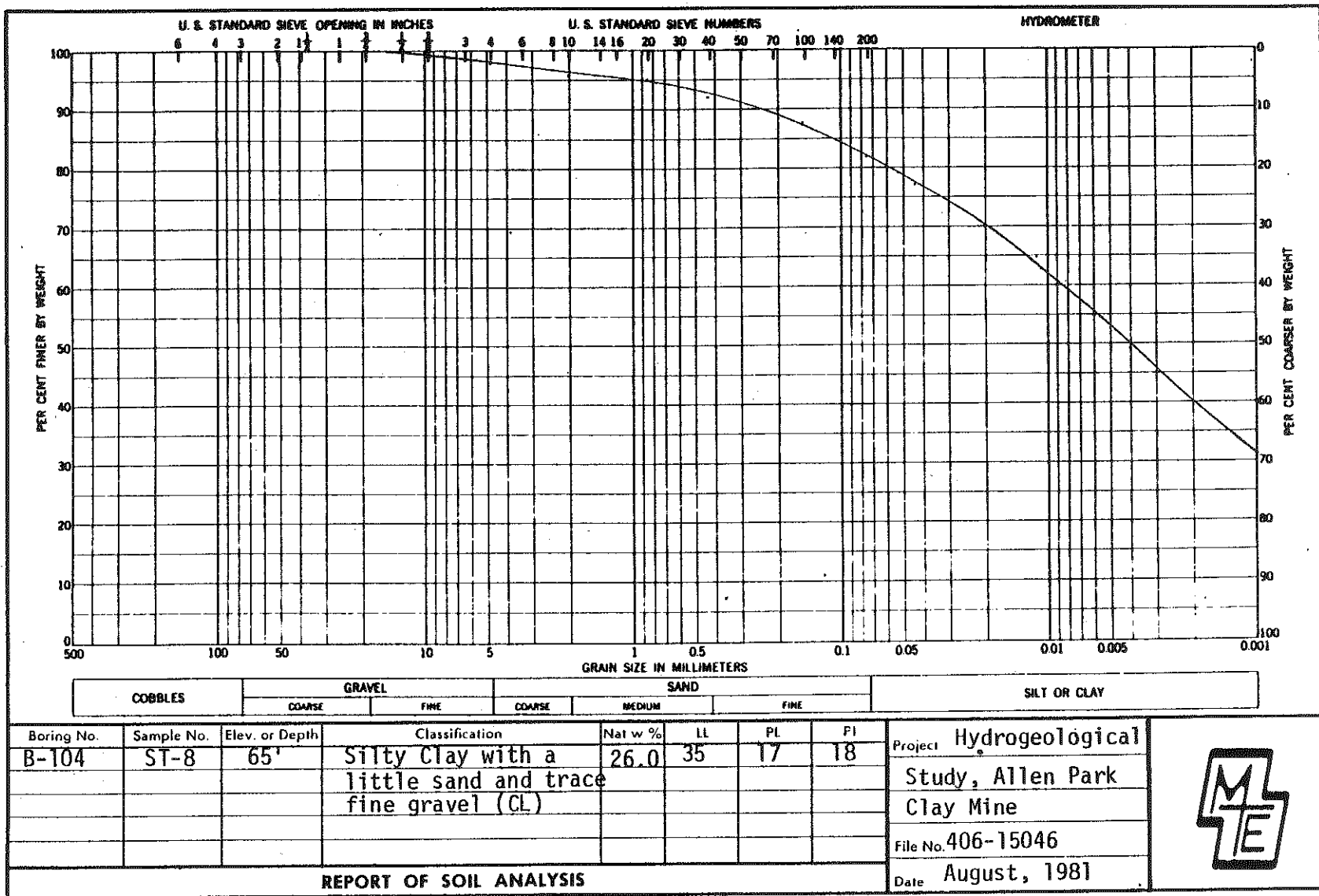


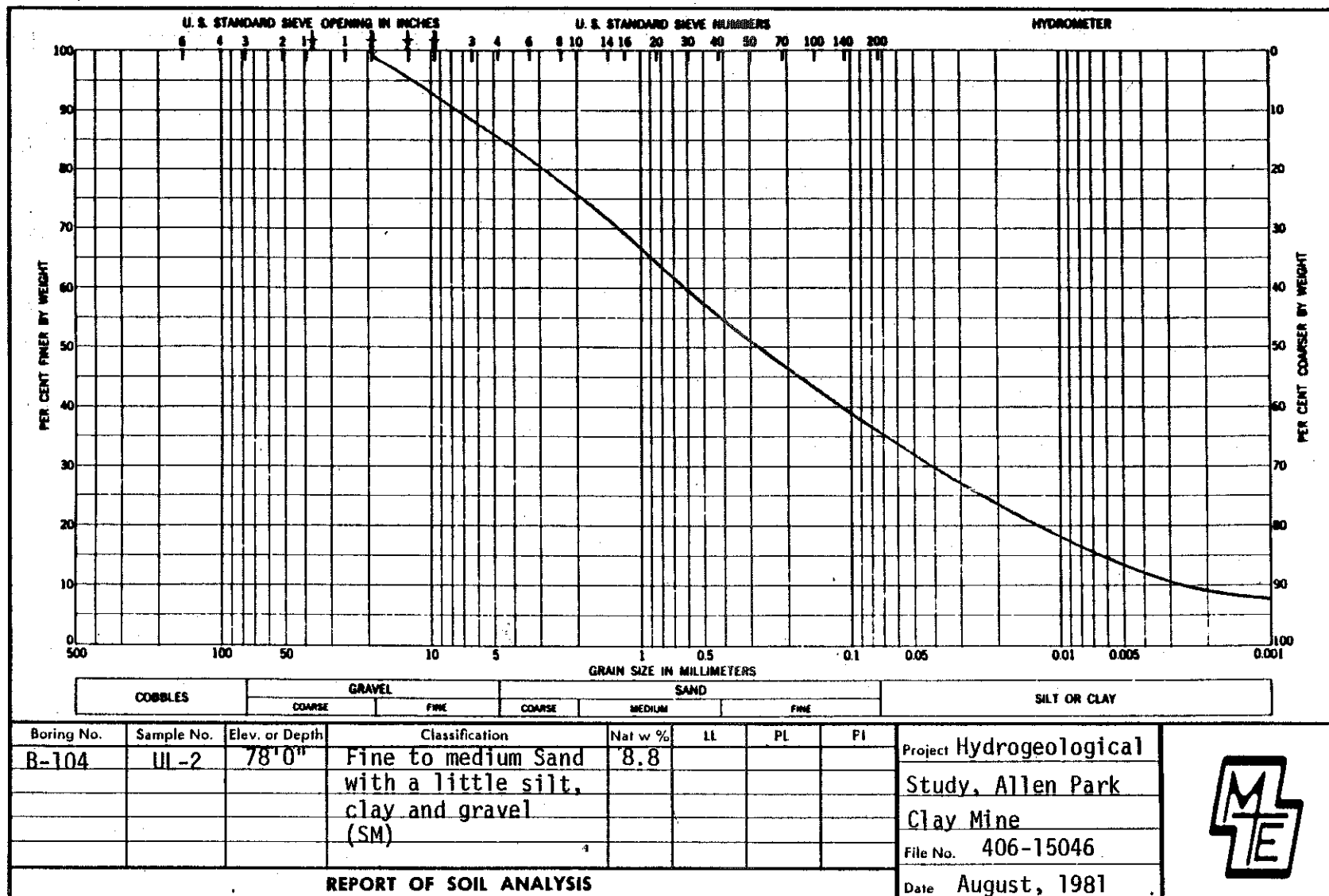


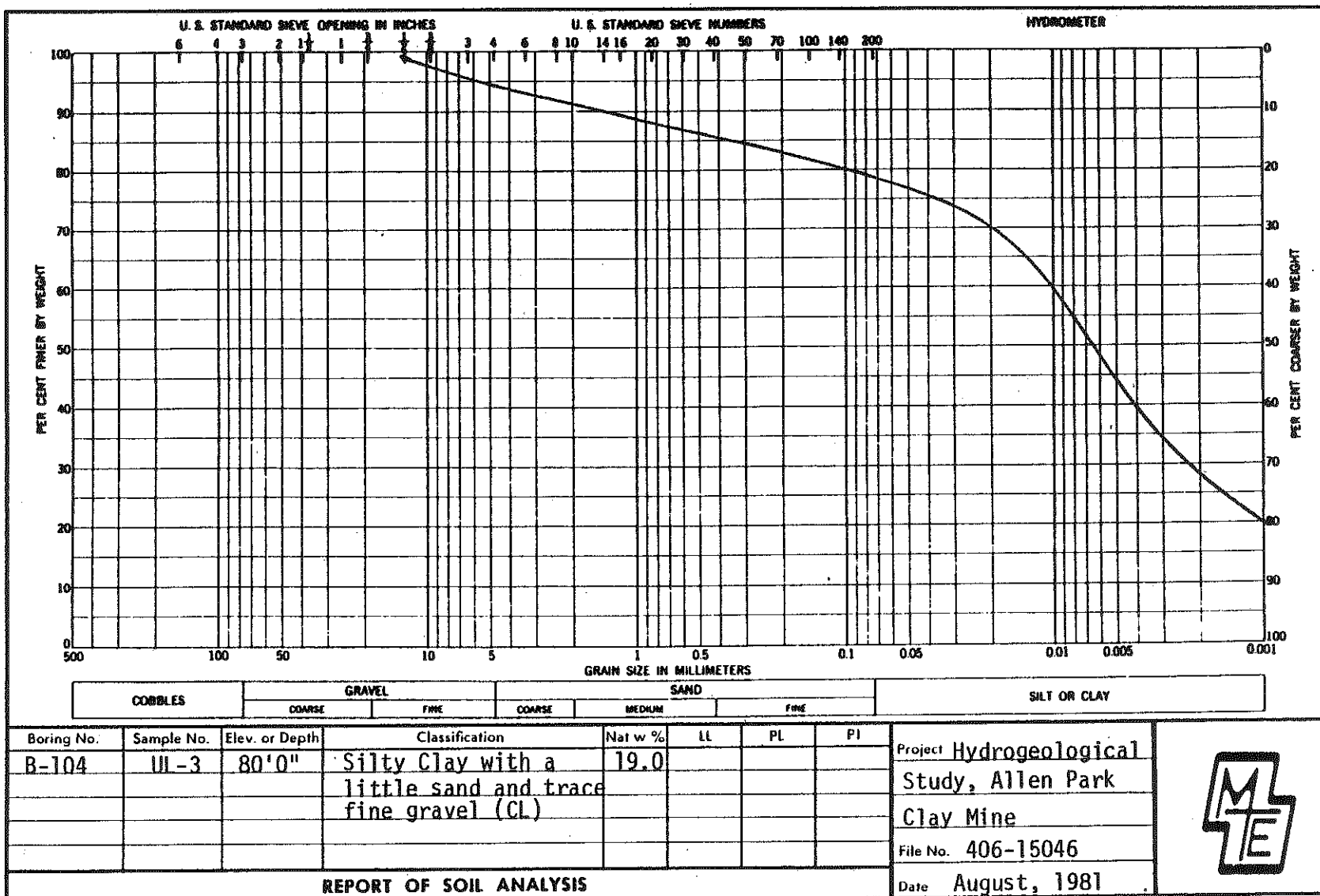


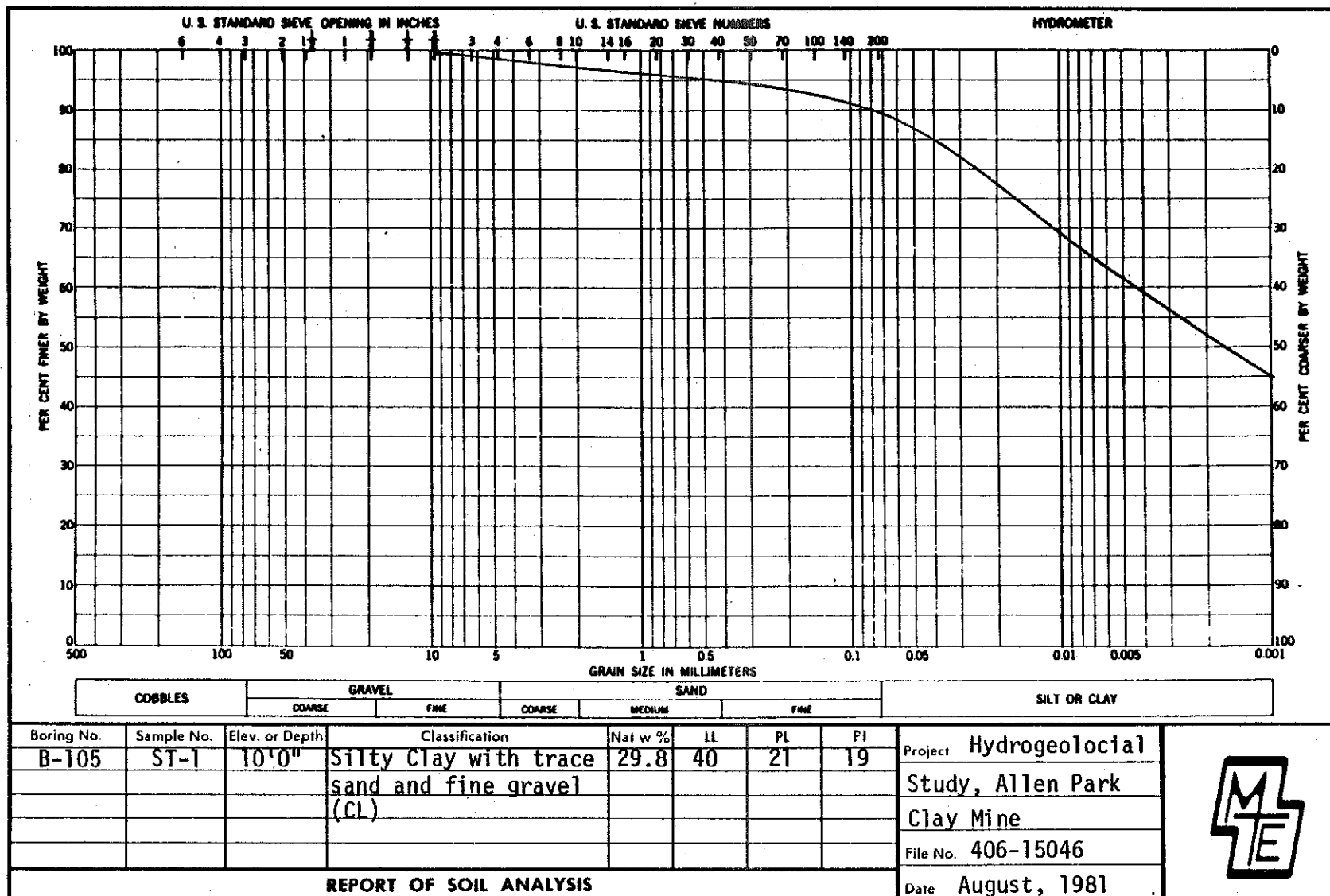


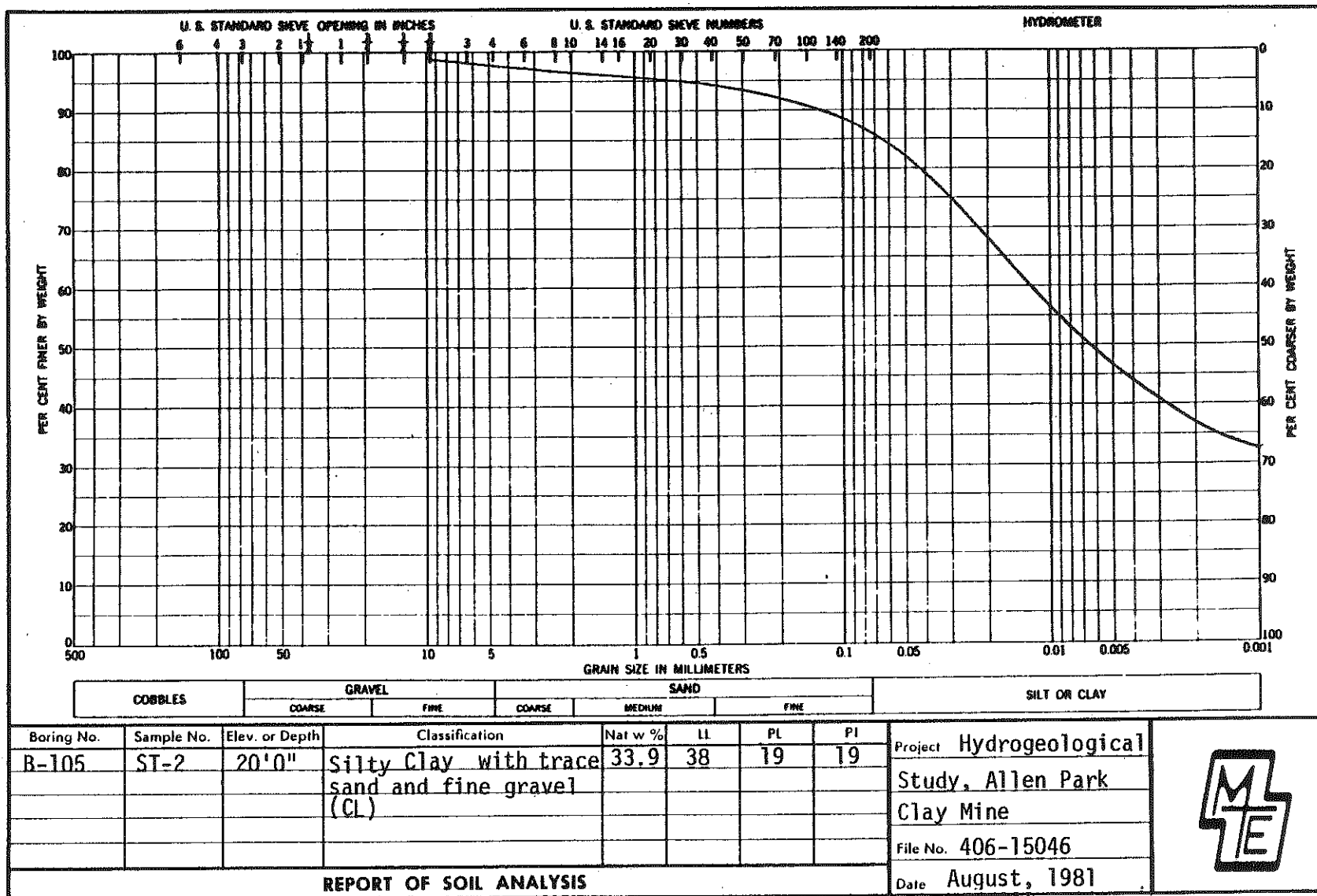


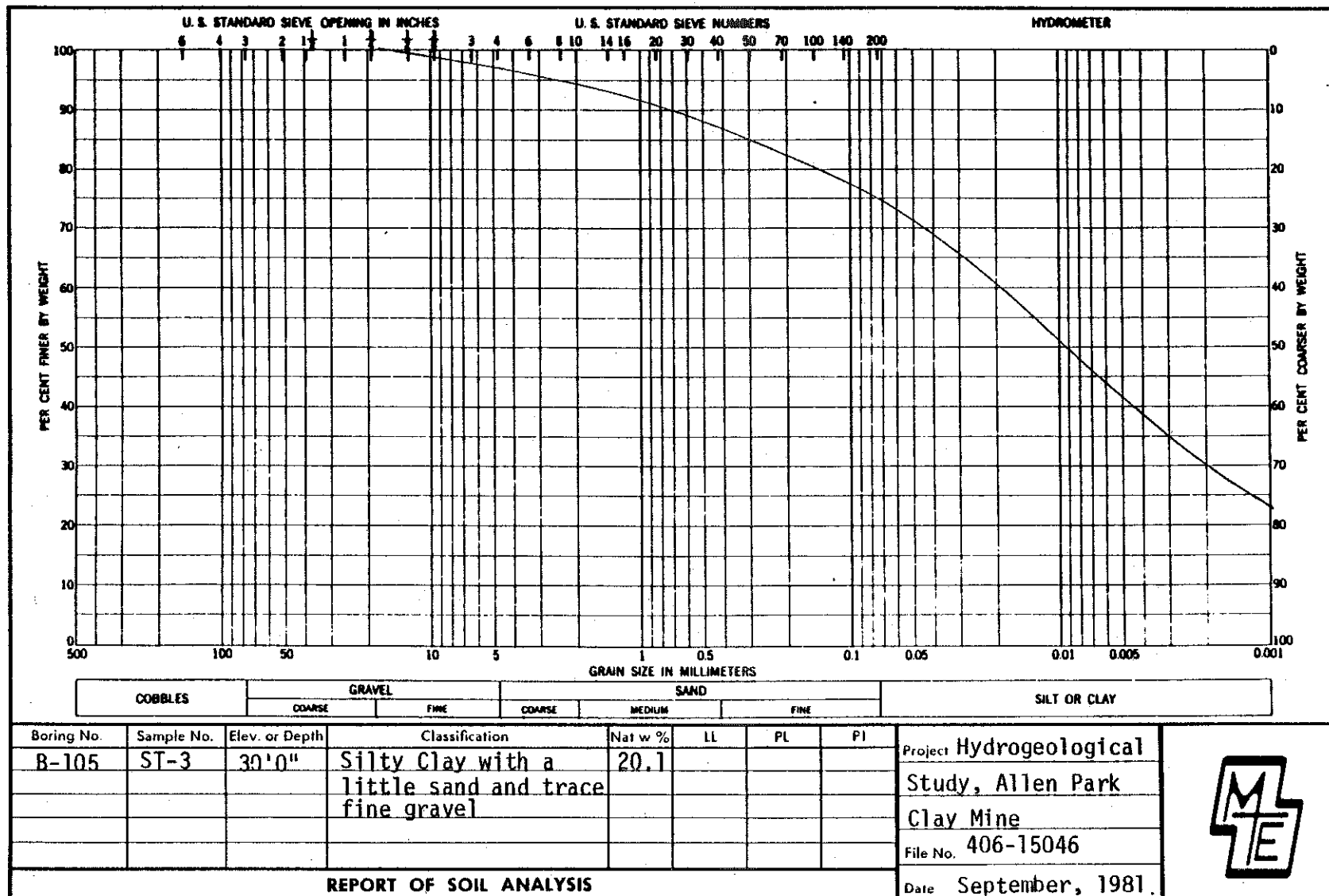


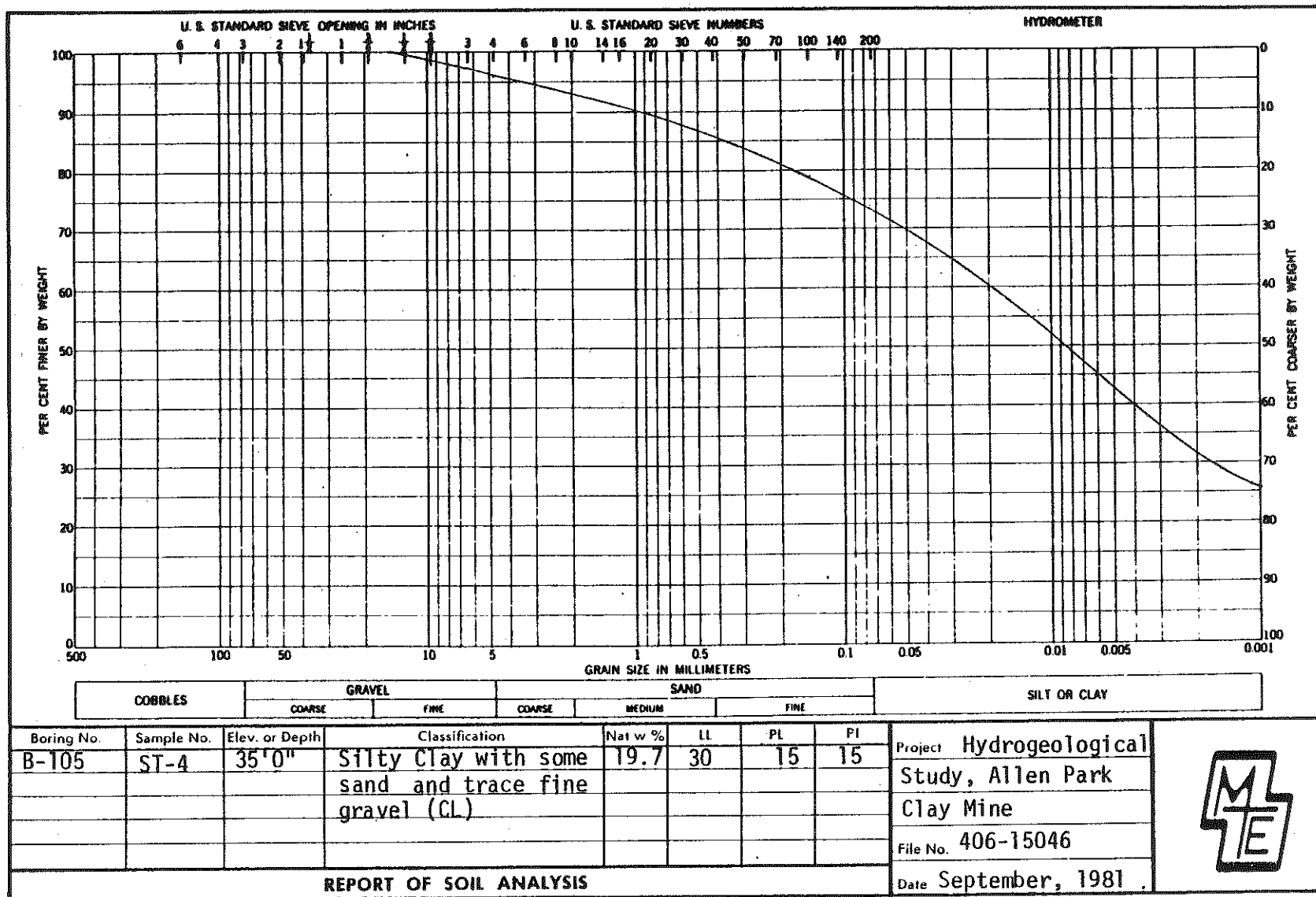


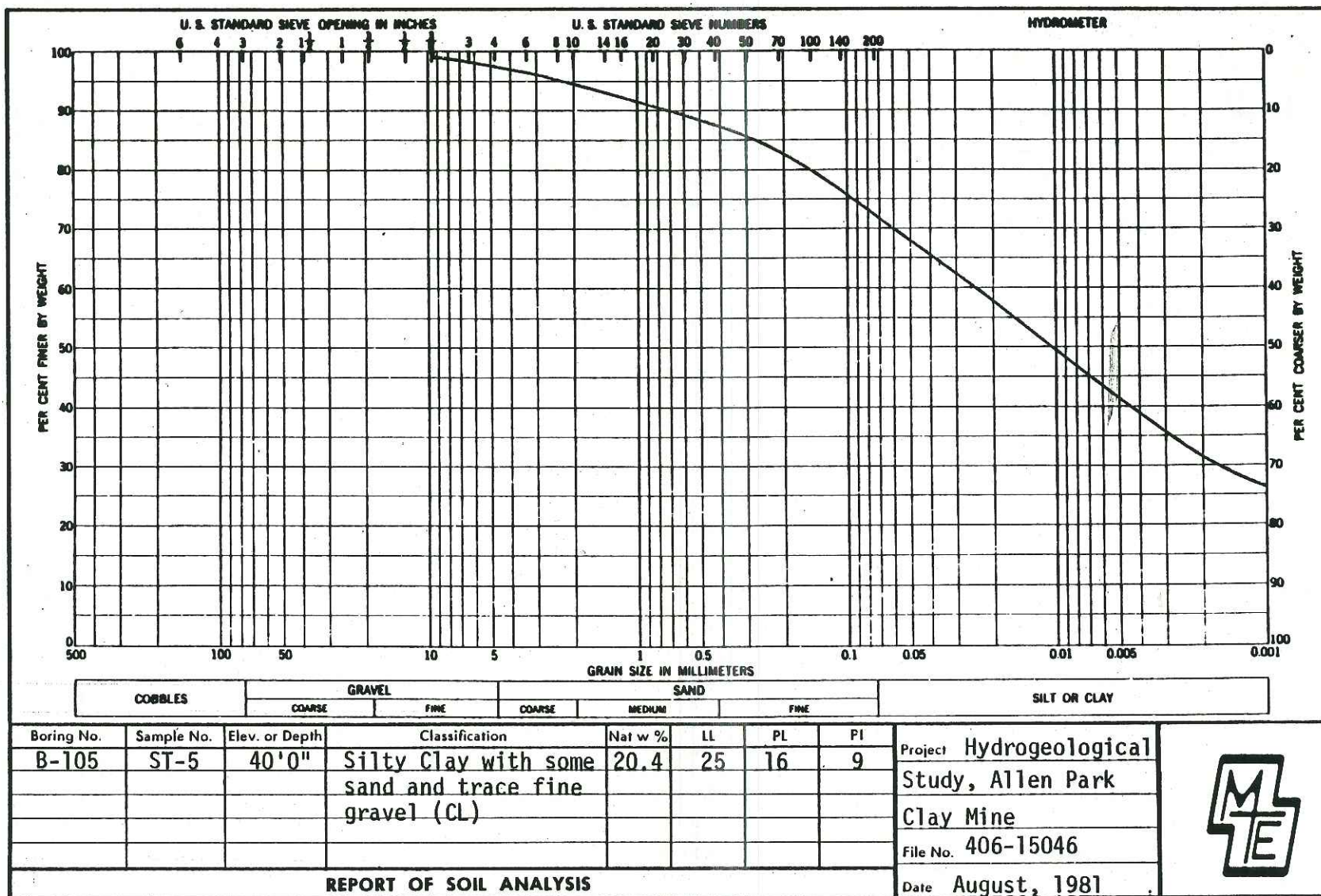


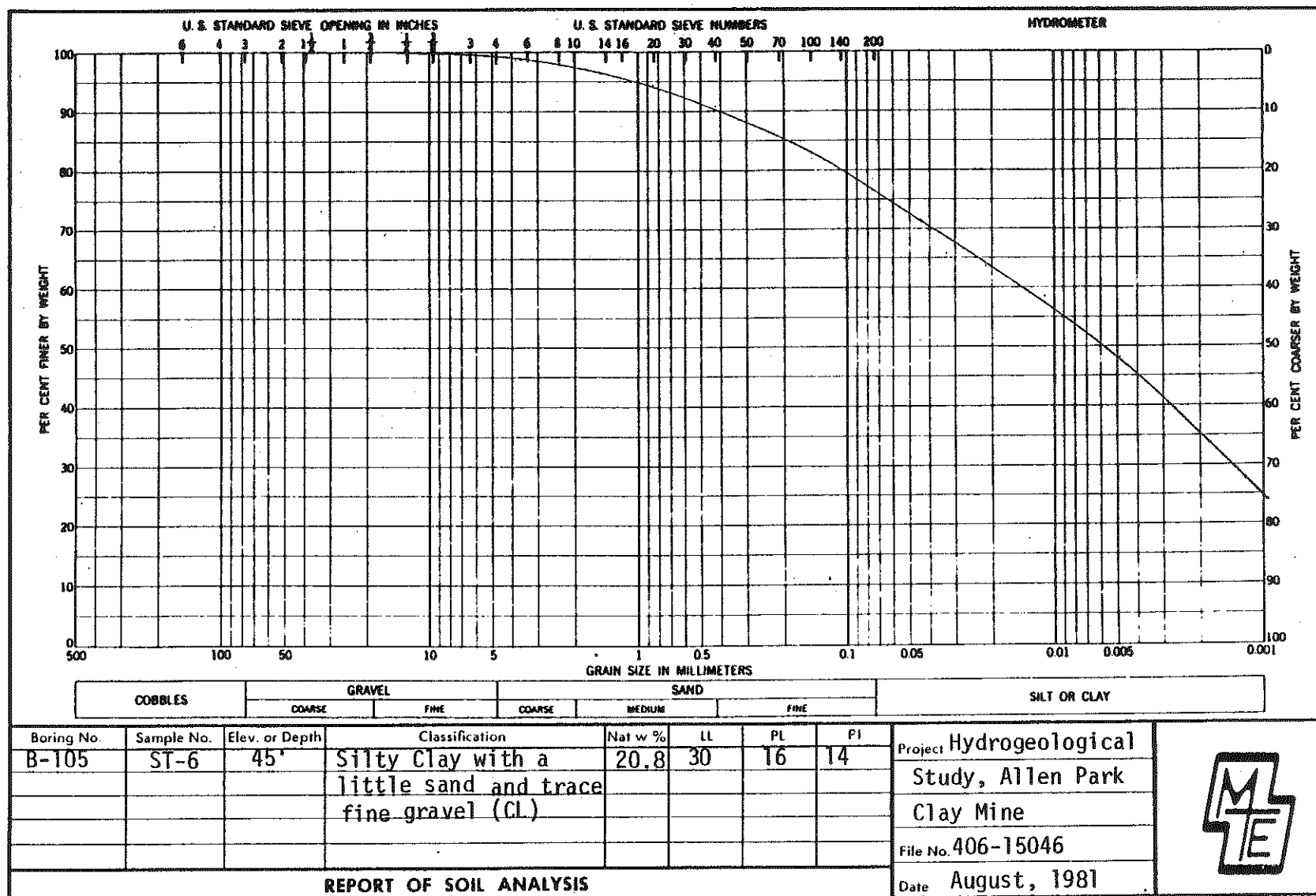


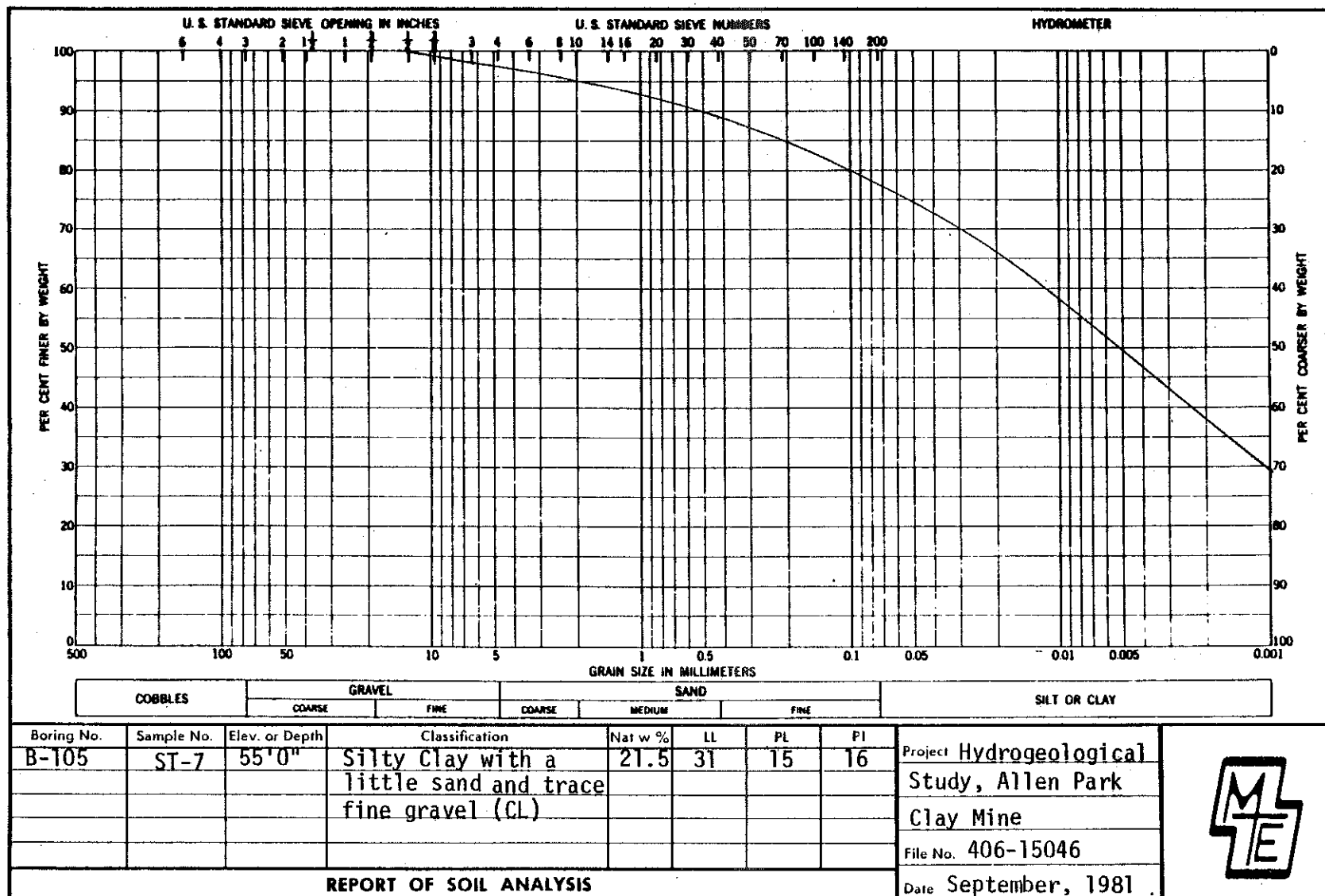












APPENDIX B

SOIL BORING (WELL) LOGS CURRENT PROJECT



PROJECT Hydrogeological Study

JOB NO. 406-15046

LOCATION Allen Park Clay Mine

SURFACE ELEV. +593.9 DATE 8-6-81

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|--|-------|--------|--|---|------------|---|--------------------|--------------------------|--------|
| | | 0'9" | Silty, clayey SAND with organics (Topsoil) (CL-ML) | | | | | | |
| | 1 | 3'0" | Very silty CLAY, with trace sand, gray, moist (CL) | | | | | | |
| | 2 | | | | | | | | |
| | 3 | | | | | | | | |
| | 4 | 6'0" | Silty CLAY, with trace sand, gray, moist (CL) | | | | | | |
| | 5 | | | | | | | | |
| | 6 | | | | | | | | |
| | 7 | 13'0" | Fine to medium, SAND, brown, moist (SP) } No recovery | | | | | | |
| | 8 | | | | | | | | |
| | 9 | | | | | | | | |
| | 10 | | | | | | | | |
| ST 1 | 11 | | | | | | | | |
| | 12 | | | | | | | | |
| | 13 | | | | | | | | |
| | 14 | 13'0" | Silty CLAY with trace sand and fine gravel, gray, moist (CL) (LL=24, PI=8) } With thin fine sand partings (LL=36, PI=19) | | | | | | |
| | 15 | | | | 22.3 | 122.8 | 100.4 | | |
| ST 2 | 16 | | | | | | | | |
| | 17 | | | | | | | | |
| | 18 | | | | | | | | |
| | 19 | | | | | | | | |
| ST 3 | 20 | | | | 33.4 | 121.4 | 91.0 | | |
| | 21 | | | | | | | | |
| | 22 | | | | | | | | |
| | 23 | | | | | | | | |
| | 24 | | | | | | | | |
| | 25 | | | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | Artesian ground water encountered at 75'6". | | | |
| | | | | | | Sheet 1 of 4 | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. W-101

PROJECT Hydrogeological Study

JOB NO. 406-15046

LOCATION Allen Park Clay Mine

SURFACE ELEV. +593.9

DATE 8-6-81

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural WL P.C.F. | Dry Den WL P.C.F. | Unc. Comp. Strength PSF. | Sti % |
|---------------|-------|--------|--|-----------------------------|---------------|----------------------|----------------------|-----------------------------|----------|
| | 26 | | Silty CLAY with a little sand and trace fine gravel, gray, moist (CL) | | | | | | |
| | 27 | | | | | | | | |
| | 28 | | | | | | | | |
| | 29 | | | | | | | | |
| ST 4 | 30 | | (LL=27, PI=11) | | 19.3 | | | | |
| | 31 | | | | | | | | |
| | 32 | | | | | | | | |
| | 33 | | | | | | | | |
| | 34 | | | | | | | | |
| ST 5 | 35 | | (LL=29, PI=14) | | 19.3 | 129.8 | 108.8 | | |
| | 36 | | | | | | | | |
| | 37 | | | | | | | | |
| | 38 | | | | | | | | |
| | 39 | | | | | | | | |
| ST 6 | 40 | | (LL=21, PI=7) | | 16.6 | | | | |
| | 41 | | ↓ Becoming clayey silt (CL-ML) | | | | | | |
| | 42 | | | | | | | | |
| | 43 | | | | | | | | |
| | 44 | | | | | | | | |
| ST 7 | 45 | | (LL=30, PI=14) | | 20.1 | 131.3 | 109.3 | | |
| | 46 | | ↓ Becoming silty clay (CL) | | | | | | |
| | 47 | | | | | | | | |
| | 48 | | | | | | | | |
| | 49 | | | | | | | | |
| | 50 | | | | | | | | |

TYPE OF SAMPLE
D. - DISTURBED
U.L. - UNDIST. LINER
S.T. - SHELBY TUBE
S.S. - SPLIT SPOON
R.C. - ROCK CORE
() - PENETROMETER

REMARKS:

Standard Penetration Test — Driving 2" OD Sampler 1' With
140# Hammer Falling 30"; Count Made At 6" Intervals

Sheet 2 of 4



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. W-101

PROJECT Hydrogeological Study

JOB NO. 406-15046

LOCATION Allen Park Clay Mine

SURFACE ELEV. +593.9

DATE 8-6-81

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural WL P.C.F. | Dry Den WL P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|---|-------|--------|---|-----------------------------|---------------|----------------------|----------------------|-----------------------------|-----------|
| | 51 | | Silty CLAY with a little fine sand and trace fine gravel, gray, moist (CL) (LL=32, PI=15) | | | | | | |
| | 52 | | | | | | | | |
| | 53 | | | | | | | | |
| | 54 | | | | | | | | |
| ST 8 | 55 | | | | 21.9 | | | | |
| | 56 | | | | | | | | |
| | 57 | | | | | | | | |
| | 58 | | | | | | | | |
| | 59 | | | | | | | | |
| | 60 | | | | | | | | |
| | 61 | | Becoming clayey silt with fine sand (CL-ML) (LL=17, PI=7) | | | | | | |
| | 62 | | | | | | | | |
| | 63 | | | | | | | | |
| | 64 | | | | | | | | |
| ST 9 | 65 | | | | 15.4 | | | | |
| | 66 | | | | | | | | |
| | 67 | | | | | | | | |
| | 68 | | | | | | | | |
| | 69 | | | | | | | | |
| | 70 | | | | | | | | |
| | 71 | | Becoming very silty clay (CL) (Shelby Tube refusal at 75 Ft.) (LL=27, PI=11) | | | | | | |
| | 72 | | | | | | | | |
| | 73 | | | | | | | | |
| | 74 | | | | | | | | |
| ST 10 | 75 | | | | 18.5 | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | Sheet 3 of 4 | | | | |

SURFACE ELEV. +593.9

DATE 8-6-81

PROJECT Hydrogeologic

LOCATION Allen Park Clay

Allen Park, Mic i

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural WL P.C.F. | Dry Den W' C.F. |
|---------------|-------|--------|---|-----------------------------|---------------|----------------------|--------------------|
| | 76 | 75'6" | CLAY with trace fine sand and occasional gravel, gray, moist (CL) | | | | |
| | 77 | 77'0" | Medium SAND with trace fine gravel, gray, saturated (SP) | | | | |
| | 78 | 78'0" | Silty, sandy CLAY, very stiff to hard (Hardpan) | | | | |
| | 79 | | | | | | |
| UL | 80 | | Silty CLAY with some sand and trace fine gravel, gray, moist, very stiff (CL) | | | | |
| 1 | 81 | 80'6" | | 8 | | | |
| | 82 | | | 9 | 15.7 | | |
| | 83 | | | 15 | | | |
| | 84 | | | | | | |
| | 85 | | | | | | |
| | 86 | | | | | | |
| | 87 | | | | | | |
| | 88 | | | | | | |
| | 89 | | | | | | |
| | 90 | | | | | | |
| | 91 | | | | | | |
| | 92 | | | | | | |
| | 93 | | | | | | |
| | 94 | | | | | | |
| | 95 | | | | | | |
| | 96 | | | | | | |
| | 97 | | | | | | |
| | 98 | | | | | | |
| | 99 | | | | | | |
| | 100 | | | | | | |

Boring terminated at 80'6"

Well Data:

Well screen tip set at depth of 78'3" below existing ground level.

Elevation of top of PVC standpipe: +601.47.

REMARKS:

TYPE OF SAMPLE
D. - DISTURBED
U.L. - UNDIST. LINER
S.T. - SHELBY TUBE
S.S. - SPLIT SPOON
R.C. - ROCK CORE
() - PENETROMETER

Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals



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LOG OF SOIL BORING NO. _____

W-102

PROJECT Hydrogeological Study

JOB NO. 406-15046

LOCATION Allen Park Clay Mine

SURFACE ELEV. +591.3

DATE 8-7-81

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|--|-------|--------|---|--------------------------|--|--------------------|--------------------|--------------------------|--------|
| | 1 | 0'9" | Silty SAND with trace clay and organics (Topsoil) (SM-ML) | | | | | | |
| | 2 | | Fine to medium, brown, moist SAND (SP) | | | | | | |
| | 3 | 3'0" | Wet | | | | | | |
| | 4 | | Silty CLAY with layers of fine sand, gray, moist, stiff (CL) | | | | | | |
| UL 1 | 5 | | | | 15.6 | | | | |
| | 6 | 6'0" | | | | | | | |
| | 7 | | Silty CLAY with a little fine sand and trace fine gravel, gray, moist (CL) | | | | | | |
| | 8 | | | | | | | | |
| | 9 | | | | | | | | |
| ST 1 | 10 | | (LL=25, PI=11) | | 16.0 | | | | |
| | 11 | | | | | | | | |
| | 12 | | | | | | | | |
| | 13 | | | | | | | | |
| | 14 | | | | | | | | |
| | 15 | | | | | | | | |
| | 16 | | | | | | | | |
| | 17 | | | | | | | | |
| | 18 | | | | | | | | |
| | 19 | | | | | | | | |
| ST 2 | 20 | | (LL=21, PI=9) | | 19.9 | | | | |
| | 21 | | | | | | | | |
| | 22 | | | | | | | | |
| | 23 | | | | | | | | |
| | 24 | | | | | | | | |
| | 25 | | | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | Ground water encountered at 2 Feet. Artesian ground water encountered at 86 feet. | | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. W-102

PROJECT Hydrogeological Study

JOB NO. 406-15046

LOCATION Allen Park Clay Mine

SURFACE ELEV. +591.3

DATE 8-7-81

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Sti % |
|---|-------|--------|---|-----------------------------|---------------|-----------------------|-----------------------|-----------------------------|----------|
| | 26 | | Silty CLAY with a little fine sand and trace fine gravel, gray, moist (CL) | | | | | | |
| | 27 | | | | | | | | |
| | 28 | | | | | | | | |
| | 29 | | | | | | | | |
| ST 3 | 30 | | | | 18.5 | | | | |
| | 31 | | (LL=24, PI=9) | | | | | | |
| | 32 | | | | | | | | |
| | 33 | | | | | | | | |
| | 34 | | | | | | | | |
| ST 4 | 35 | | | | 14.6 | | | | |
| | 36 | | (LL=20, PI=7) | | | | | | |
| | 37 | | | | | | | | |
| | 38 | | | | | | | | |
| | 39 | | | | | | | | |
| ST 5 | 40 | | | | 20.8 | | | | |
| | 41 | | (LL=28, PI=12) | | | | | | |
| | 42 | | | | | | | | |
| | 43 | | | | | | | | |
| | 44 | | | | | | | | |
| ST 6 | 45 | | | | 20.6 | 128.2 | 106.3 | | |
| | 46 | | (LL=28, PI=14) | | | | | | |
| | 47 | | | | | | | | |
| | 48 | | | | | | | | |
| | 49 | | | | | | | | |
| | 50 | | | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | Sheet 2 of 4 | | | | |



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LOG OF SOIL BORING NO.

W-102

PROJECT Hydrogeological Study

JOB NO. 406-15046

LOCATION Allen Park Clay Mine

SURFACE ELEV. +591.3

DATE 8-7-81

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|--|-------|--------|---|--------------------------|--------------|--------------------|--------------------|--------------------------|--------|
| | 51 | | Silty CLAY with a little fine sand and trace fine gravel, gray, moist (CL) | | | | | | |
| | 52 | | | | | | | | |
| | 53 | | | | | | | | |
| | 54 | | | | | | | | |
| ST 7 | 55 | | (LL=33, PI=17) | | 21.1 | | | | |
| | 56 | | | | | | | | |
| | 57 | | | | | | | | |
| | 58 | | | | | | | | |
| | 59 | | | | | | | | |
| | 60 | | | | | | | | |
| | 61 | | | | | | | | |
| | 62 | | | | | | | | |
| | 63 | | With a trace fine sand | | | | | | |
| | 64 | | | | | | | | |
| ST 8 | 65 | | (LL=47, PI=26) | | 40.4 | 108.3 | 77.1 | | |
| | 66 | | | | | | | | |
| | 67 | | | | | | | | |
| | 68 | | | | | | | | |
| | 69 | | | | | | | | |
| | 70 | | | | | | | | |
| | 71 | | | | | | | | |
| | 72 | | | | | | | | |
| | 73 | | | | | | | | |
| | 74 | | Becoming very stiff | | | | | | |
| ST 9 | 75 | | (Shelby tube refusal at 75 Ft., No sample recovery) | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | Sheet 3 of 4 | | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. W-102

PROJECT Hydrogeological Study

JOB NO. 406-15046

LOCATION Allen Park Clay Mine

SURFACE ELEV. +591.3

DATE 8-7-81

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Wtr. % |
|---|-------|--------|---|-----------------------------|---------------|-----------------------|-----------------------|-----------------------------|-----------|
| | 76 | | Silty CLAY with a little fine sand and trace fine gravel, gray, moist, very stiff (CL) | | | | | | |
| | 77 | | | | | | | | |
| | 78 | | | | | | | | |
| | 79 | | | | | | | | |
| | 80 | | | 5 | | | | | |
| UL 2 | 80 | | (LL=35, PI=15) | 8 | 24.2 | | | | |
| | 81 | | | 10 | | | | | |
| | 82 | | | | | | | | |
| | 83 | | | | | | | | |
| | 84 | | ↓ (CL-ML) | | | | | | |
| ST 10 | 85 | | (LL=19, PI=7) (Shelby tube refusal at 85'6") | | 11.6 | | | | |
| | 86 | 86'0" | | | | | | | |
| | 87 | | Medium SAND with trace fine gravel, gray, saturated (SP) | | | | | | |
| | 88 | | | | | | | | |
| | 89 | | | | | | | | |
| | 90 | | | | | | | | |
| | 91 | 91'0" | | | | | | | |
| | 92 | | Silty SAND and clay, hard, slightly moist (Hardpan) | | | | | | |
| | 93 | | | | | | | | |
| | 94 | 93'6" | | | | | | | |
| | 95 | | Boring terminated at 93'6" | | | | | | |
| | 96 | | Well Data: | | | | | | |
| | 97 | | Well screen set at 93 feet below existing grade. | | | | | | |
| | 98 | | Elevation of top of PVC standpipe: +600.81 | | | | | | |
| | 99 | | | | | | | | |
| | 100 | | | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | Sheet 4 of 4 | | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. W-103

PROJECT Hydrogeological Study

JOB NO. 406-15046

LOCATION Allen Park Clay Mine

SURFACE ELEV. +593.9

DATE 8-10-81

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|--|-------|--------|---|-----------------------------|--|-----------------------|-----------------------|-----------------------------|-----------|
| | 1 | 0'7" | Silty SAND with trace clay and organics (Topsoil) (SM-ML) | | | | | | |
| | 2 | | Fine to medium SAND, brown, moist (SP) | | | | | | |
| | 3 | | | | | | | | |
| | 4 | | Wet ↓ | | | | | | |
| | 5 | | | | | | | | |
| | 6 | | | | | | | | |
| | 7 | | | | | | | | |
| | 8 | 8'0" | | | | | | | |
| | 9 | | Silty CLAY with a little sand, gray, moist (CL) | | | | | | |
| | 10 | | | | | | | | |
| ST 1 | 11 | | (LL=45, PI=22) | | 27.1 | | | | |
| | 12 | | | | | | | | |
| | 13 | | | | | | | | |
| | 14 | | | | | | | | |
| | 15 | | | | | | | | |
| | 16 | | ↓ With trace fine gravel | | | | | | |
| | 17 | | | | | | | | |
| | 18 | | | | | | | | |
| | 19 | | | | | | | | |
| | 20 | | | | | | | | |
| ST 2 | 21 | | (LL=28, PI=11) | | 26.8 | | | | |
| | 22 | | | | | | | | |
| | 23 | | | | | | | | |
| | 24 | | | | | | | | |
| | 25 | | | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | Ground water encountered at 4'0". Artesian ground water encountered at 85 feet. Sheet 1 of 4 | | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. _____

W-103

PROJECT Hydrogeological Study

JOB NO. 406-15046

LOCATION Allen Park Clay Mine

SURFACE ELEV. +593.9

DATE 8-10-81

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|---|-------|--------|---|-----------------------------|---------------|-----------------------|-----------------------|-----------------------------|-----------|
| | 26 | | Silty CLAY with some sand and trace fine gravel, gray, moist (CL) | | | | | | |
| | 27 | | | | | | | | |
| | 28 | | | | | | | | |
| | 29 | | | | | | | | |
| | 30 | | | | | | | | |
| ST 3 | 31 | | (LL=25, PI=10) | | 17.6 | | | | |
| | 32 | | | | | | | | |
| | 33 | | | | | | | | |
| | 34 | | | | | | | | |
| | 35 | | | | | | | | |
| ST 4 | 36 | | (LL=24, PI=10) | | 18.8 | | | | |
| | 37 | | | | | | | | |
| | 38 | | | | | | | | |
| | 39 | | | | | | | | |
| | 40 | | | | | | | | |
| ST 5 | 41 | | (LL=25, PI=10) | | 19.9 | | | | |
| | 42 | | | | | | | | |
| | 43 | | | | | | | | |
| | 44 | | | | | | | | |
| | 45 | | | | | | | | |
| ST 6 | 46 | | (LL=28, PI=12) | | 20.1 | 130.8 | 108.9 | | |
| | 47 | | | | | | | | |
| | 48 | | | | | | | | |
| | 49 | | | | | | | | |
| | 50 | | | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | Sheet 2 of 4 | | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. W-103

PROJECT Hydrogeological Study

JOB NO. 406-15046

LOCATION Allen Park Clay Mine

SURFACE ELEV. +593.9

DATE 8-10-81

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows Per 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|--|-------|--------|--|-----------------------------|---------------|-----------------------|-----------------------|-----------------------------|-----------|
| | 51 | | Silty CLAY with a little sand and trace fine gravel, gray, moist (CL) | | | | | | |
| | 52 | | | | | | | | |
| | 53 | | | | | | | | |
| | 54 | | | | | | | | |
| | 55 | | | | | | | | |
| ST 7 | 56 | | | | 20.5 | | | | |
| | 57 | | | | | | | | |
| | 58 | | | | | | | | |
| | 59 | | | | | | | | |
| | 60 | | | | | | | | |
| | 61 | | (LL=32, PI=15) | | | | | | |
| | 62 | | | | | | | | |
| | 63 | | | | | | | | |
| | 64 | | | | | | | | |
| | 65 | | | | | | | | |
| ST 8 | 66 | | | | 23.3 | 127.2 | 103.2 | | |
| | 67 | | | | | | | | |
| | 68 | | | | | | | | |
| | 69 | | | | | | | | |
| | 70 | | | | | | | | |
| | 71 | | | | | | | | |
| | 72 | | | | | | | | |
| | 73 | | | | | | | | |
| | 74 | | | | | | | | |
| | 75 | | | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | Sheet 3 of 4 | | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. _____

W-103

JOB NO. 406-15046

PROJECT Hydrogeological Study

LOCATION Allen Park Clay Mine

SURFACE ELEV. +593.9

DATE 8-10-81

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|---|-------|--------|---|-----------------------------|---------------|-----------------------|-----------------------|-----------------------------|-----------|
| | | | | | 22.3 | | | | |
| ST 9 | 76 | | Silty CLAY with a little sand and trace fine gravel, gray, moist (CL) (LL=28, PI=11) | | | | | | |
| | 77 | | | | | | | | |
| | 78 | | | | | | | | |
| | 79 | | | | | | | | |
| | 80 | | | | | | | | |
| | 81 | | | | | | | | |
| | 82 | | | | | | | | |
| | 83 | | | | | | | | |
| ST 10 | 84 | | | | | | | | |
| | 85 | 85'0" | (LL=26, PI=11) | | 16.0 | | | | |
| | 86 | | Medium SAND with a trace fine gravel, gray, saturated (SP) | | | | | | |
| | 87 | | | | | | | | |
| | 88 | | | | | | | | |
| | 89 | | | | | | | | |
| | 90 | | | | | | | | |
| | 91 | 91'0" | | | | | | | |
| | 92 | | Silty SAND and clay, hard, slightly moist (Hardpan) | | | | | | |
| | 93 | 93'0" | | | | | | | |
| | 94 | | Boring terminated at 93'0" Well Data: Well screen set at 92'6" below existing grade Elevation of top of PVC standpipe: +605.06 | | | | | | |
| | 95 | | | | | | | | |
| | 96 | | | | | | | | |
| | 97 | | | | | | | | |
| | 98 | | | | | | | | |
| | 99 | | | | | | | | |
| | 100 | | | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | Sheet 4 of 4 | | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. _____

W-104

PROJECT Hydrogeological Study

JOB NO. 406-15046

LOCATION Allen Park Clay Mine

SURFACE ELEV. +594.1

DATE 8-12-81

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|--|-------|--------|--|-----------------------------|---------------|---|-----------------------|-----------------------------|-----------|
| | 1 | 1'4" | Silty CLAY with trace sand, dark brown, moist with organics (Topsoil) | | | | | | |
| | 2 | | Silty CLAY with a little sand, mottled brown and gray, moist (CL) | | | | | | |
| | 3 | | | | | | | | |
| | 4 | | | | | | | | |
| UL 1 | 5 | | | | 26.3 | | | | |
| | 6 | | | | | | | | |
| | 7 | | | | | | | | |
| | 8 | | | | | | | | |
| | 9 | | | | | | | | |
| ST 1 | 10 | 10'0" | | | 31.1 | | | | |
| | 11 | | (LL=47, PI=24) | | | | | | |
| | 12 | | Silty CLAY with a little sand, gray, moist (CL) ↓ Becoming more plastic (CH) (LL=52, PI=29) | | | | | | |
| | 13 | | | | | | | | |
| | 14 | | | | | | | | |
| | 15 | | | | | | | | |
| | 16 | | | | | | | | |
| | 17 | | | | | | | | |
| | 18 | | | | | | | | |
| | 19 | | | | | | | | |
| ST 2 | 20 | | | | 38.5 | | | | |
| | 21 | | | | | | | | |
| | 22 | | | | | | | | |
| | 23 | | | | | | | | |
| | 24 | | | | | | | | |
| | 25 | | | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | | Artesian ground water encountered at 73 feet Sheet 1 of 4 | | | |



PROJECT Hydrogeological Study

JOB NO. 406-15046

LOCATION Allen Park Clay Mine

SURFACE ELEV. +594.1

DATE 8-12-81

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|---|-------|--------|---|-----------------------------|---------------|-----------------------|-----------------------|-----------------------------|-----------|
| | 26 | | ↓ (CL) | | | | | | |
| | 27 | | | | | | | | |
| | 28 | | Silty CLAY with a little sand and trace fine gravel, gray, moist (CL) | | | | | | |
| | 29 | | | | | | | | |
| ST 3 | 30 | | (LL=25, PI=10) | | 19.5 | | | | |
| | 31 | | | | | | | | |
| | 32 | | | | | | | | |
| | 33 | | | | | | | | |
| | 34 | | | | | | | | |
| ST 4 | 35 | | (LL=26, PI=11) | | 19.5 | | | | |
| | 36 | | | | | | | | |
| | 37 | | | | | | | | |
| | 38 | | | | | | | | |
| | 39 | | | | | | | | |
| ST 5 | 40 | | (LL=25, PI=10) | | 19.5 | | | | |
| | 41 | | | | | | | | |
| | 42 | | | | | | | | |
| | 43 | | | | | | | | |
| | 44 | | | | | | | | |
| ST 6 | 45 | | (LL=24, PI=9) | | 18.7 | 130.0 | 109.5 | | |
| | 46 | | | | | | | | |
| | 47 | | | | | | | | |
| | 48 | | | | | | | | |
| | 49 | | | | | | | | |
| | 50 | | | | | | | | |
| TYPE OF SAMPLE O. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | Sheet 2 of 4 | | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. W-104

PROJECT Hydrogeological Study

JOB NO. 406-15046

LOCATION Allen Park Clay Mine

SURFACE ELEV. +594.1

DATE 8-12-81

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|---|-------|--------|---|-----------------------------|---------------|-----------------------|-----------------------|-----------------------------|-----------|
| | 51 | | Silty CLAY with a little sand and trace fine gravel, gray, moist (CL) (LL=31, PI=14) | | | | | | |
| | 52 | | | | | | | | |
| | 53 | | | | | | | | |
| | 54 | | | | | | | | |
| ST 7 | 55 | | | | 22.0 | | | | |
| | 56 | | | | | | | | |
| | 57 | | | | | | | | |
| | 58 | | | | | | | | |
| | 59 | | | | | | | | |
| | 60 | | | | | | | | |
| | 61 | | | | | | | | |
| | 62 | | | | | | | | |
| | 63 | | | | | | | | |
| | 64 | | | | | | | | |
| ST 8 | 65 | | (LL=35, PI=18) | | 26.0 | 124.8 | 99.0 | | |
| | 66 | | | | | | | | |
| | 67 | | | | | | | | |
| | 68 | | | | | | | | |
| | 69 | | | | | | | | |
| | 70 | | | | | | | | |
| | 71 | | | | | | | | |
| | 72 | | | | | | | | |
| | 73 | 73'0" | | | | | | | |
| | 74 | | Silty, sandy CLAY, very stiff to hard (HARDPAN) | | | | | | |
| | 75 | | | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | Sheet 3 of 4 | | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. W-104

PROJECT Hydrogeological Study

JOB NO. 406-15046

LOCATION Allen Park Clay Mine

SURFACE ELEV. +594.1

DATE 8-10-81

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|---------------|-------|--------|---|-----------------------------|---------------|-----------------------|-----------------------|-----------------------------|-----------|
| | | 75'6" | | | | | | | |
| | 76 | | Fine to medium SAND, gray, saturated (SP). | | | | | | |
| | 77 | 77'0" | | | | | | | |
| UL 2 | 78 | | Fine to medium SAND with a little clay, silt and gravel, gray, moist, very dense (SM) (HARDPAN) | 15 | 8.8 | | | | |
| | 79 | 79'6" | | 24 | | | | | |
| | | | | 44 | | | | | |
| | 80 | | Silty CLAY with a little sand and trace fine gravel, gray, moist, extremely hard (CL) | | | | | | |
| UL 3 | 81 | | | 50 | 19.0 | | | | |
| | 82 | | | 50/3" | | | | | |
| | 83 | | | - | | | | | |
| | 84 | | | | | | | | |
| | 85 | | | | | | | | |
| | 86 | 86'0" | | | | | | | |
| | 87 | | Boring terminated at 86 Feet Well Data: Monitor Well set at 85'6" below existing grade. Elevation of top of PVC standpipe: +603.82 | | | | | | |
| | 88 | | | | | | | | |
| | 89 | | | | | | | | |
| | 90 | | | | | | | | |
| | 91 | | | | | | | | |
| | 92 | | | | | | | | |
| | 93 | | | | | | | | |
| | 94 | | | | | | | | |
| | 95 | | | | | | | | |
| | 96 | | | | | | | | |
| | 97 | | | | | | | | |
| | 98 | | | | | | | | |
| | 99 | | | | | | | | |
| | 100 | | | | | | | | |

TYPE OF SAMPLE
D. - DISTURBED
U.L. - UNDIST. LINER
S.T. - SHELBY TUBE
S.S. - SPLIT SPOON
R.C. - ROCK CORE
() - PENETROMETER

REMARKS:

Standard Penetration Test — Driving 2" OD Sampler 1' With
140# Hammer Falling 30"; Count Made At 6" Intervals



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. W-105

PROJECT Hydrogeological Study

JOB NO. 406-15046

LOCATION Allen Park Clay Mine

SURFACE ELEV. +594.5 DATE 8-11-81

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural WL P.C.F. | Dry Den WL P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|--|-------|--------|---|-----------------------------|---|----------------------|----------------------|-----------------------------|-----------|
| | | 0'6" | Silty, clayey SAND, dark brown with organics (Topsoil) (SM-ML) | | | | | | |
| | 1 | | | | | | | | |
| | 2 | | Silty CLAY with a little sand and trace fine gravel, brown, moist (CL) | | | | | | |
| | 3 | | | | | | | | |
| | 4 | | | | | | | | |
| | 5 | | | | | | | | |
| | 6 | | | | | | | | |
| | | 6'6" | | | | | | | |
| | 7 | | Silty CLAY with trace sand and fine gravel, gray, moist (CL) | | | | | | |
| | 8 | | | | | | | | |
| | 9 | | | | | | | | |
| | 10 | | | | | | | | |
| ST 1 | 11 | | (LL=40, PI=19) | | 29.8 | | | | |
| | 12 | | | | | | | | |
| | 13 | | | | | | | | |
| | 14 | | | | | | | | |
| | 15 | | | | | | | | |
| | 16 | | | | | | | | |
| | 17 | | | | | | | | |
| | 18 | | | | | | | | |
| | 19 | | | | | | | | |
| | 20 | | | | | | | | |
| ST 2 | 21 | | (LL=38, PI=19) | | 33.9 | | | | |
| | 22 | | | | | | | | |
| | 23 | | | | | | | | |
| | 24 | | | | | | | | |
| | 25 | | | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | Artesian ground water encountered at 72'6". | | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. W-105

PROJECT Hydrogeological Study

JOB NO. 406-15046

LOCATION Allen Park Clay Mine

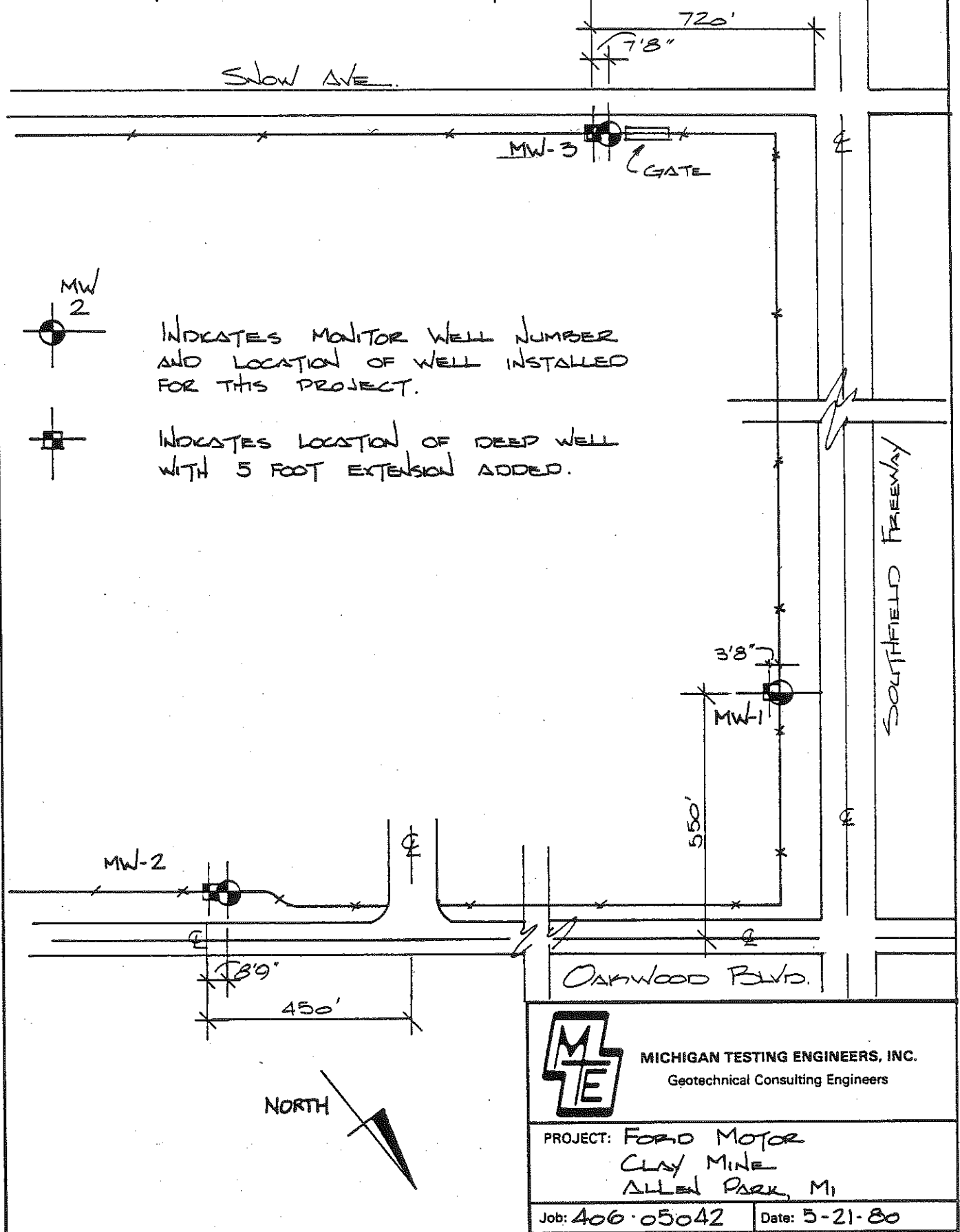
SURFACE ELEV. +594.5

DATE 8-11-81

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural WL P.C.F. | Dry Den WL P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|---|-------|--------|---|-----------------------------|---------------|----------------------|----------------------|-----------------------------|-----------|
| | 26 | | Silty CLAY with a little sand and trace fine gravel, moist, gray (CL) | | | | | | |
| | 27 | | | | | | | | |
| | 28 | | | | | | | | |
| | 29 | | | | | | | | |
| | 30 | | | | | | | | |
| ST 3 | 31 | | (LL=25, PI=10) | | 20.1 | | | | |
| | 32 | | | | | | | | |
| | 33 | | | | | | | | |
| | 34 | | | | | | | | |
| | 35 | | | | | | | | |
| ST 4 | 36 | | (LL=30, PI=15) | | 19.7 | | | | |
| | 37 | | | | | | | | |
| | 38 | | | | | | | | |
| | 39 | | | | | | | | |
| | 40 | | | | | | | | |
| ST 5 | 41 | | (LL=25, PI=9) | | 20.4 | | | | |
| | 42 | | | | | | | | |
| | 43 | | | | | | | | |
| | 44 | | | | | | | | |
| | 45 | | | | | | | | |
| ST 6 | 46 | | (LL=30, PI=14) | | 20.8 | 129.5 | 107.2 | | |
| | 47 | | | | | | | | |
| | 48 | | | | | | | | |
| | 49 | | | | | | | | |
| | 50 | | | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | Sheet 2 of 4 | | | | |

MONITOR WELL LOCATION PLAN



MICHIGAN TESTING ENGINEERS, INC.
Geotechnical Consulting Engineers

PROJECT: FORD MOTOR
CLAY MINE
ALLEN PARK, MI

Job: 406-05042

Date: 5-21-80



PROJECT Hydrogeological Study

JOB NO. 406-15046

LOCATION Allen Park Clay Mine

SURFACE ELEV. +594.5

DATE 8-11-81

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|---------------|-------|--------|--|-----------------------------|---------------|-----------------------|-----------------------|-----------------------------|-----------|
| | 76 | | Medium SAND with a trace fine gravel, gray, saturated (SP) | | | | | | |
| | 77 | | | | | | | | |
| | 78 | | | | | | | | |
| | 79 | 79'0" | | | | | | | |
| | 80 | | Silty SAND and CLAY, hard, slightly moist (Hardpan) | | | | | | |
| | 81 | | | | | | | | |
| | 82 | | | | | | | | |
| | 82 | 82'6" | | | | | | | |
| | 83 | | Boring terminated at 82'6" Well Data: Monitor well screen set at 82' below existing grade. Elevation of top of PVC standpipe: +604.08 | | | | | | |
| | 84 | | | | | | | | |
| | 85 | | | | | | | | |
| | 86 | | | | | | | | |
| | 87 | | | | | | | | |
| | 88 | | | | | | | | |
| | 89 | | | | | | | | |
| | 90 | | | | | | | | |
| | 91 | | | | | | | | |
| | 92 | | | | | | | | |
| | 93 | | | | | | | | |
| | 94 | | | | | | | | |
| | 95 | | | | | | | | |
| | 96 | | | | | | | | |
| | 97 | | | | | | | | |
| | 98 | | | | | | | | |
| | 99 | | | | | | | | |
| | 100 | | | | | | | | |

TYPE OF SAMPLE
D. - DISTURBED
U.L. - UNDIST. LINER
S.T. - SHELBY TUBE
S.S. - SPLIT SPOON
R.C. - ROCK CORE
() - PENETROMETER

REMARKS:

Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals

APPENDIX D

MTE SHALLOW WELL INSTALLATION REPORT - JUNE 1980



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. _____

W-105

PROJECT Hydrogeological Study

JOB NO. 406-15046

LOCATION Allen Park Clay Mine

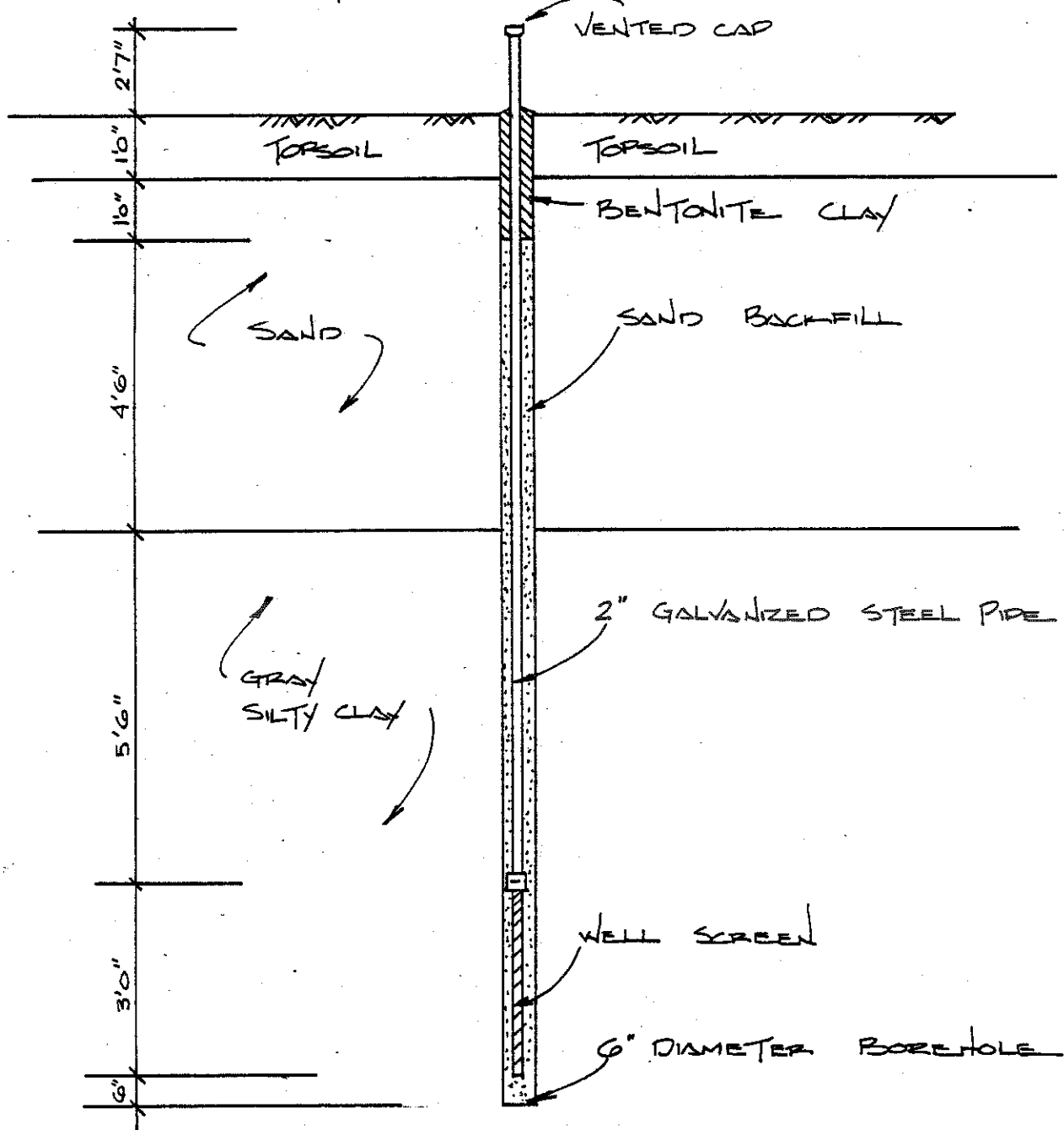
SURFACE ELEV. +594.5

DATE 8-11-81

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural WL P.C.F. | Dry Den WL P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|---|-------|--------|---|-----------------------------|---------------|----------------------|----------------------|-----------------------------|-----------|
| | 51 | | Silty CLAY with a little sand and trace fine gravel, gray, moist (CL) (LL=31, PI=16) | | | | | | |
| | 52 | | | | | | | | |
| | 53 | | | | | | | | |
| | 54 | | | | | | | | |
| | 55 | | | | | | | | |
| ST 7 | 56 | | | | 21.5 | | | | |
| | 57 | | | | | | | | |
| | 58 | | | | | | | | |
| | 59 | | | | | | | | |
| | 60 | | | | | | | | |
| | 61 | | ↓ Without gravel (LL=34, PI=14) | | | | | | |
| | 62 | | | | | | | | |
| | 63 | | | | | | | | |
| | 64 | | | | | | | | |
| | 65 | | | | | | | | |
| ST 8 | 66 | | | | 25.6 | 123.4 | 98.2 | | |
| | 67 | | | | | | | | |
| | 68 | | | | | | | | |
| | 69 | | | | | | | | |
| | 70 | | | | | | | | |
| | 71 | | Medium SAND with a trace fine gravel, gray, saturated (SP) | | | | | | |
| | 72 | 72' 6" | | | | | | | |
| | 73 | | | | | | | | |
| | 74 | | | | | | | | |
| | 75 | | | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | Sheet 3 of 4 | | | | |

MONITOR WELL #1



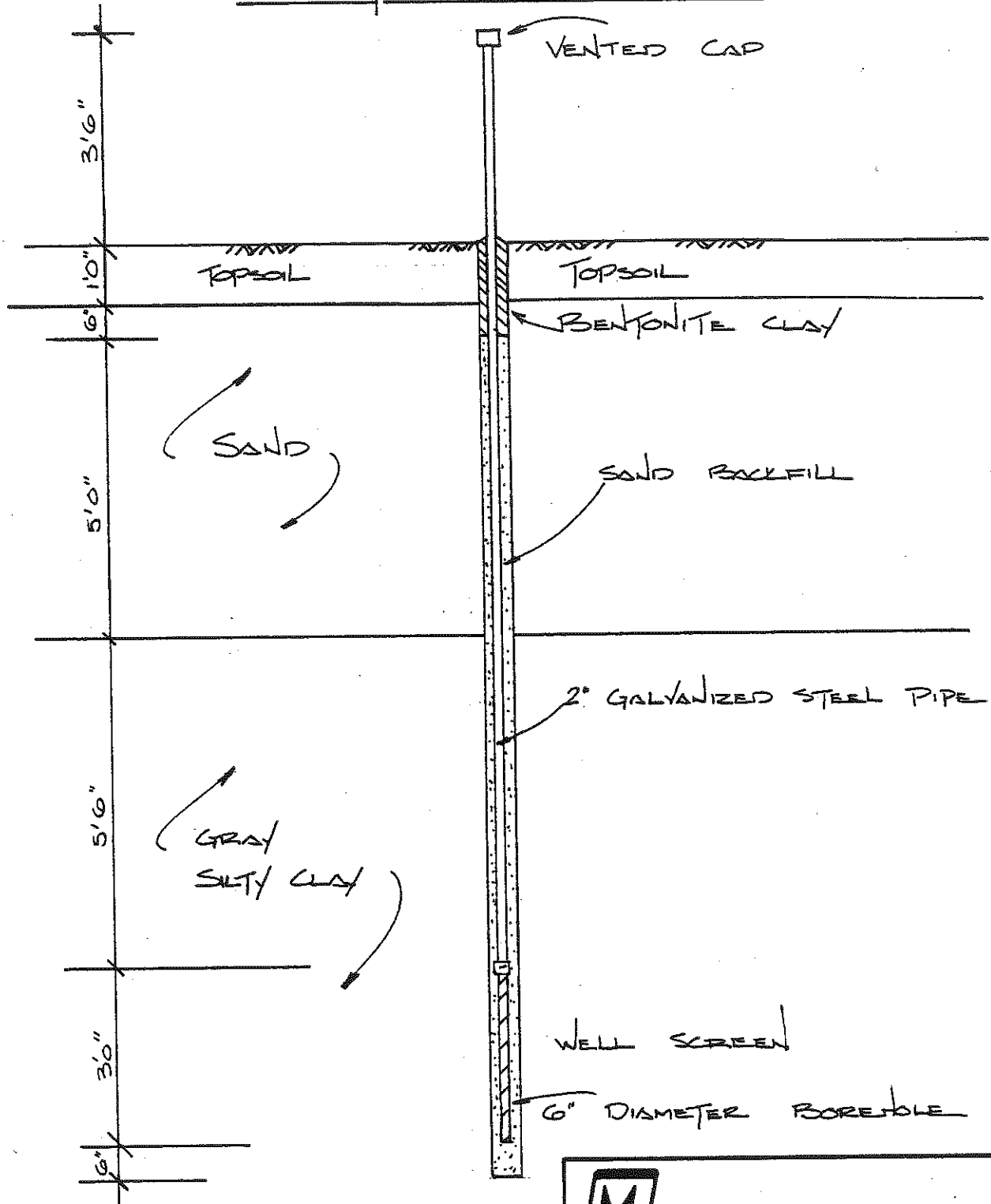
MICHIGAN TESTING ENGINEERS, INC.
Geotechnical Consulting Engineers

PROJECT: FORD MOTOR
CLAY MINE
ALLEN PARK, MI

Job: 406-05042

Date: 5-21-80

MONITOR WELL #2

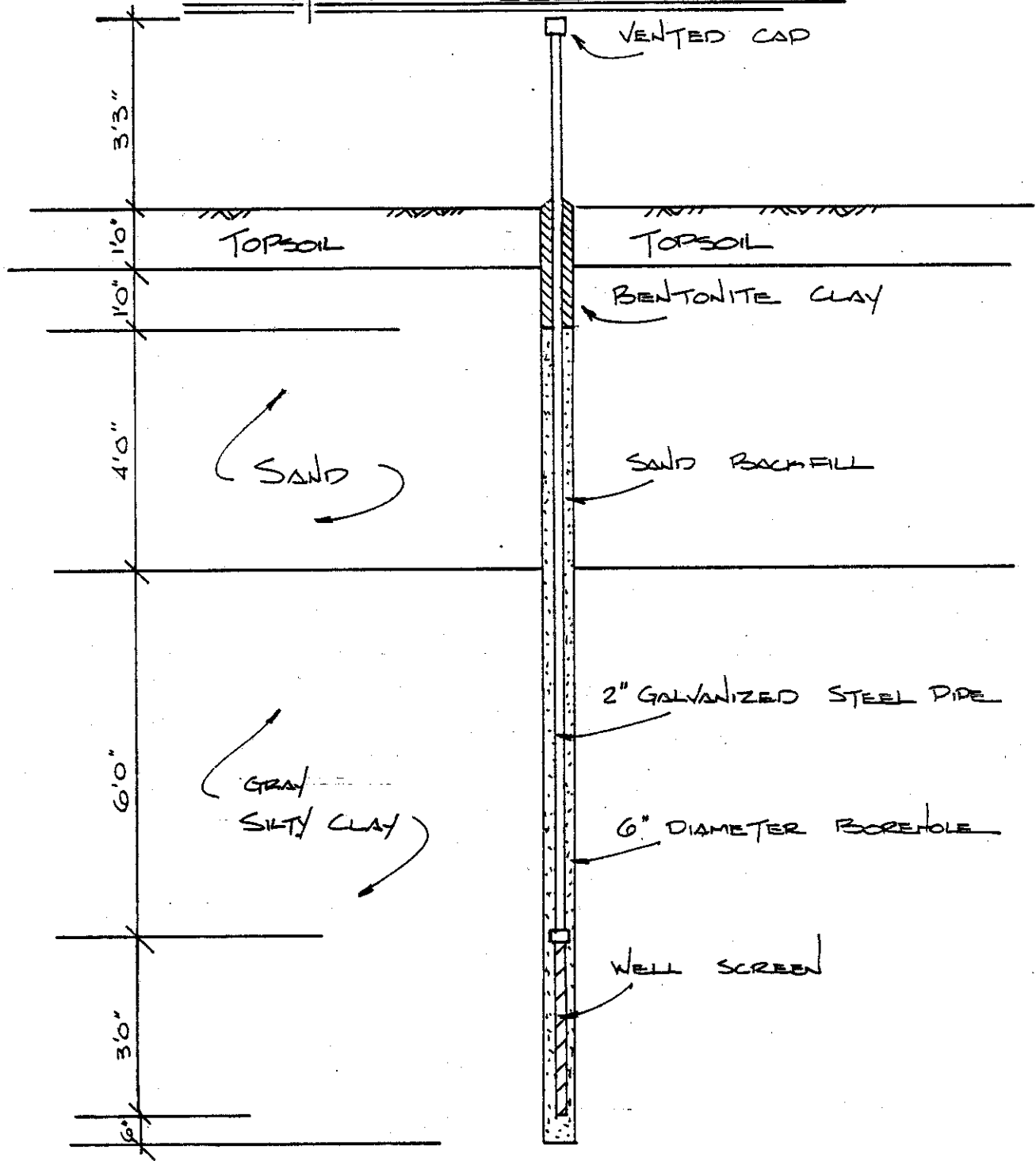


MICHIGAN TESTING ENGINEERS, INC.
Geotechnical Consulting Engineers

PROJECT: FORD MOTOR
CLAY MINE
ALLEN PARK, MI

Job: 406-05042

Date: 5-21-80



MICHIGAN TESTING ENGINEERS, INC.
Geotechnical Consulting Engineers

PROJECT: FORD MOTOR
CLAY MINE
ALLEN PARK, MI

Job: 406-05042

Date: 5-21-80

APPENDIX E

LABORATORY TEST DATA

MTE REPORT - OCTOBER 1979

MICHIGAN TESTING ENGINEERS, INC.

LABORATORY TEST RESULTS

Summary of Pertinent Facts From MTE File No. 64-9623

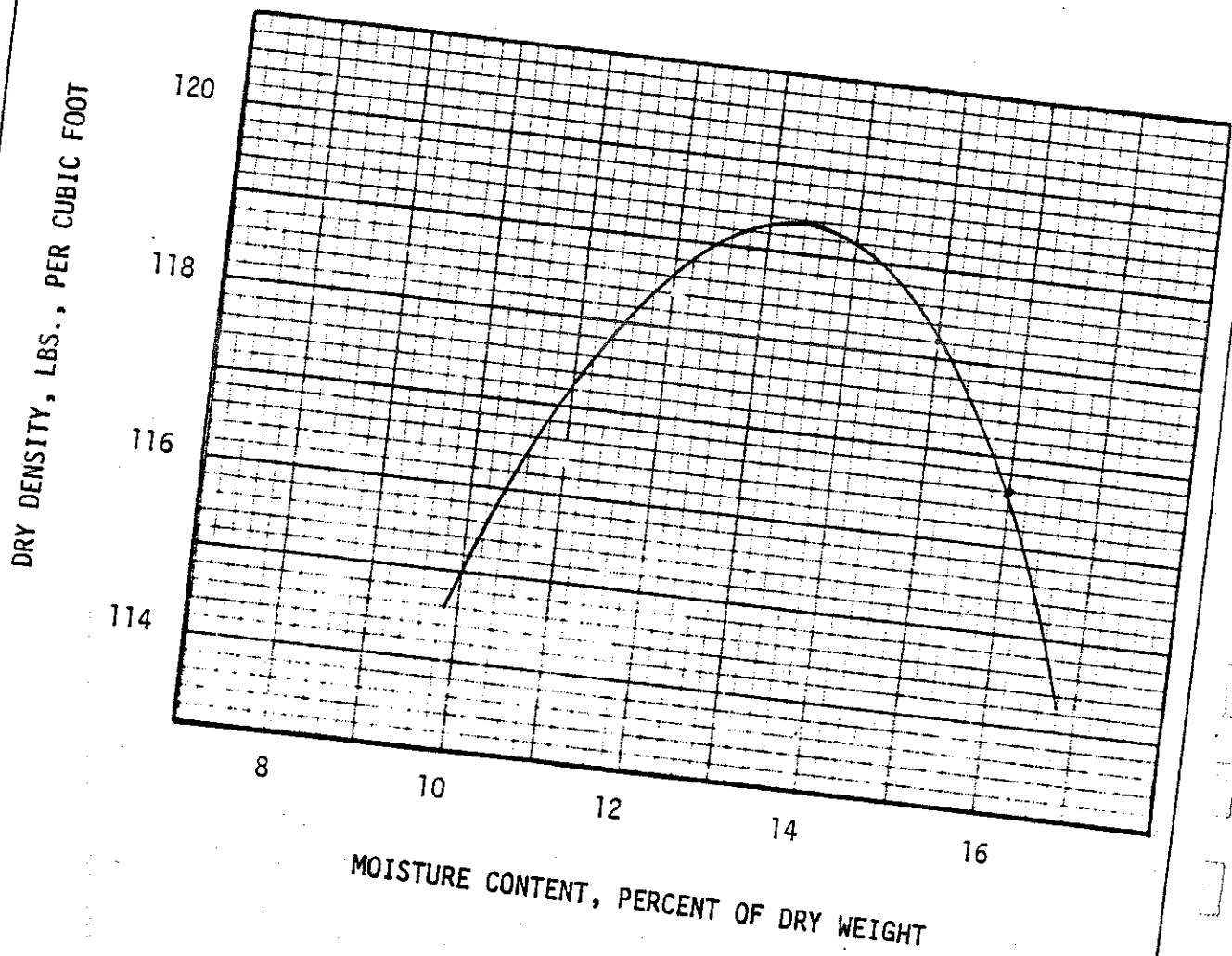
Project: Allen Park Clay Mine
Allen Park, Michigan

Date: October 1979

| <u>Sample No.</u> | <u>Moisture Content, %</u> | <u>Dry Density PCF</u> | <u>Coefficient Of Permeability, cm/sec</u> |
|-----------------------|--------------------------------|----------------------------|--|
| 1 | 10.8 | 126.7 | 5.4×10^{-8} |
| 2 | 13.2 | 116.2 | 9.1×10^{-8} |

REPORT OF MOISTURE DENSITY RELATIONSHIP

Visual Classification: Silty Clay, with occasional silt seams, blue,
moist (CL)
Boring: N.A.
Depth: Surface
Method of Test: ASTM D 1557-70 (Modified Proctor)
Test Results: Maximum Dry Density 119.4 lbs/ft³
Optimum Moisture Content 13.4 %



REPORT OF MOISTURE DENSITY RELATIONSHIP

Visual Classification: Silty Clay, with little sand, blue, Moist

Boring: N.A.

Depth: Surface

Method of Test: ASTM D 1557-70 (Modified Proctor)

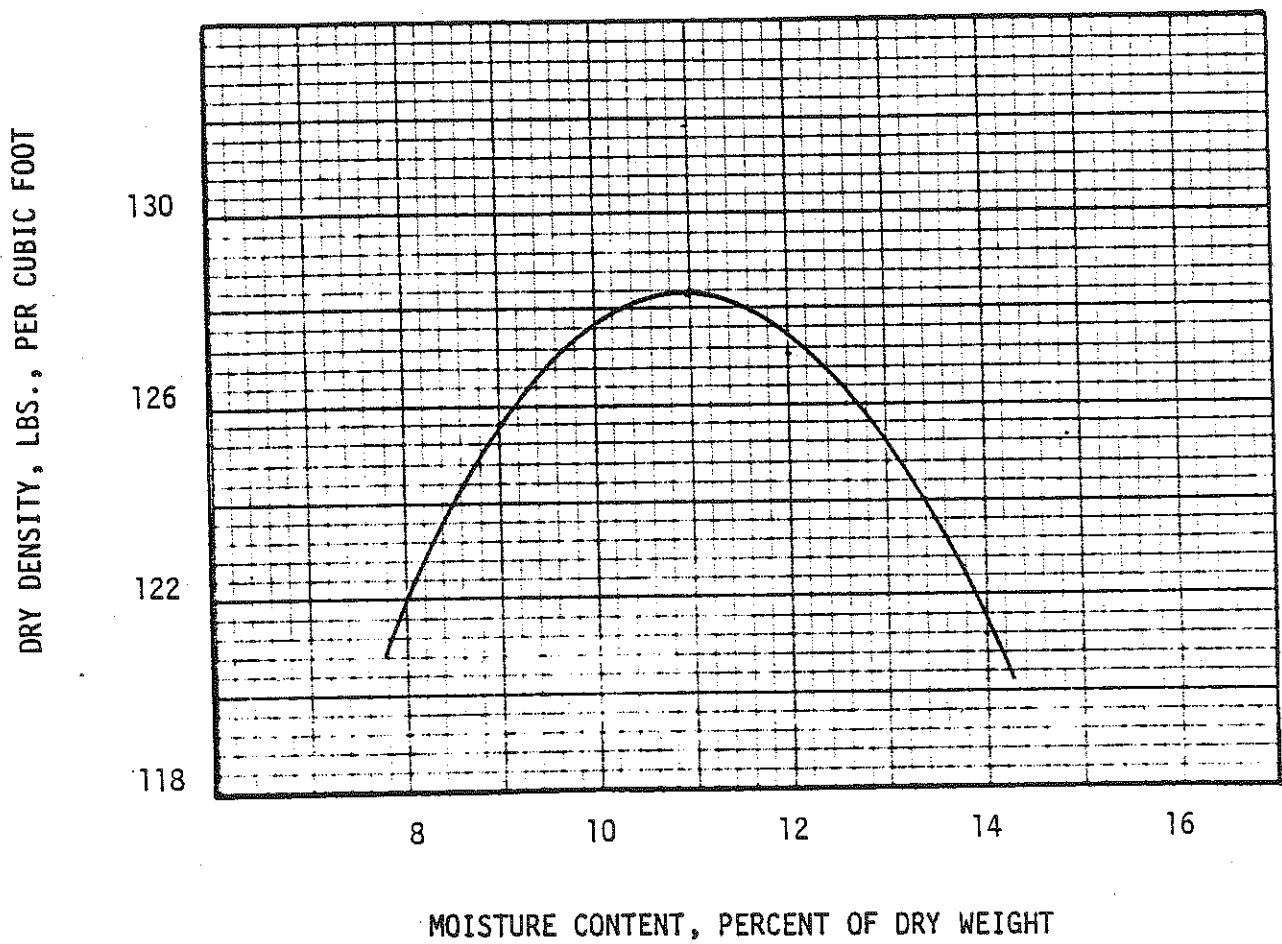
Test Results:

Maximum Dry Density

128.4 lbs/ft³

Optimum Moisture Content

11.0 %



LABORATORY TEST RESULTS

Summary of Pertinent Facts from MTE File No. 64-8519

Project: Allen Park Clay Mine
Allen Park, Michigan

Date: March 1978

| <u>Boring No.</u> | <u>Depth Feet</u> | <u>Coefficient Of Permeability, cm/sec</u> |
|-------------------|-------------------|--|
| 3 | 30 | 3.8×10^{-8} |
| 5 | 55 | 6.0×10^{-8} |
| 6 | 5 | 6.6×10^{-8} |
| 8 | 30 | 4.5×10^{-8} |

A water sample was secured from each well on March 8, 1978, and was tested for chemical oxygen demand (C.O.D.), chlorides, iron, sulphates, T.K. nitrogen, pH, phenolics, T.D.S. and carbonate hardness. The results of these tests are listed below.

| <u>Test Parameter</u> | <u>Boring #2</u> | <u>Boring #5</u> | <u>Boring #7</u> | <u>Boring #10</u> |
|-----------------------------|------------------|------------------|------------------|-------------------|
| C.O.D. | 241.0 | 188.0 | 150.0 | 346.0 |
| Chlorides | 183.0 | 165.0 | 512.0 | 146.0 |
| Iron | 0.01 | <0.01 | 0.06 | 0.05 |
| Sulfates (SO ₄) | 1250.0 | 300.0 | 675.0 | 2150.0 |
| T.K. Nitrogen | 2.7 | 2.5 | 2.2 | 3.0 |
| pH | 7.96 | 8.06 | 12.03 | 7.65 |
| Phenolics | 22.0 | <2.0 | <2.0 | <2.0 |
| T.D.S. | 2389.0 | 1161.0 | 2142.0 | 2812.0 |
| Carbonate Hardness | 1300.0 | 880.0 | 1050.0 | 1820.0 |

All the above test results, except pH and Phenolics are reported as mg/l. Phenolics are reported as $\mu\text{g/l}$.

These tests were conducted in accordance with Standard Methods for the Examination of Water and Wastewater, 14 Edition.

APPENDIX F

SOIL BORING AND DEEP MONITORING WELL LOGS

AND LABORATORY TESTING

MTE REPORT - MARCH 1978



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. _____

1

PROJECT Soils Exploration

JOB NO. 64-8519

LOCATION Allen Park Clay Mine

SURFACE ELEV. 593.42 DATE 2-23-78

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural WL P.C.F. | Dry Den WL P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|---------------|-------|--------|--|-----------------------------|---------------|----------------------|----------------------|-----------------------------|-----------|
| | 1 | | | | | | | | |
| 1A | 2 | | Firm moist mixed variegated CLAY, with sand, organic streaks and some vegetation | 4 | | | | | |
| UL | | | | 4 | | | | | |
| | 3 | | | 3 | | | | | |
| | 4 | | | | | | | | |
| 1B | 5 | | 3'9" | 3 | | | | | |
| UL | | | | 4 | | | | | |
| | 6 | | | 3 | | | | | |
| | 7 | | | | | | | | |
| 1C | 8 | | Firm moist silty blue CLAY | 3 | | | | | |
| UL | | | | 4 | | | | | |
| | 9 | | | 5 | | | | | |
| | 10 | | | | | | | | |
| 1D | 11 | | | 7 | | | | | |
| UL | | | | 7 | | | | | |
| | 12 | | | 7 | | | | | |
| | 13 | | | | | | | | |
| | 14 | | 14'0" | | | | | | |
| 1E | 15 | | | 2 | | | | | |
| UL | | | | 3 | | | | | |
| | 16 | | | 3 | | | | | |
| | 17 | | Firm moist blue CLAY, with sand | | | | | | |
| | 18 | | | | | | | | |
| | 19 | | | | | | | | |
| 1F | 20 | | | 3 | | | | | |
| UL | | | | 3 | | | | | |
| | 21 | | | 3 | | | | | |
| | 22 | | | | | | | | |
| | 23 | | | | | | | | |
| | 24 | | | | | | | | |
| 1G | 25 | | | 3 | | | | | |
| UL | | | | 4 | | | | | |
| | | | | 5 | | | | | |

| | | |
|---|---|---|
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | GROUND WATER OBSERVATIONS G.W. ENCOUNTERED AT _____ FT. _____ INS. G.W. ENCOUNTERED AT _____ FT. _____ INS. G.W. AFTER COMPLETION _____ FT. _____ INS. G.W. AFTER _____ HRS. _____ FT. _____ INS. G.W. VOLUMES _____ NONE |
|---|---|---|



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. 1

PROJECT Soils Exploration

JOB NO. 64-8519

LOCATION Allen Park Clay Mine

SURFACE ELEV. 593.42 DATE 2-23-78

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp Strength PS _i | St % |
|---|-------|--------|---|-----------------------------|--|-----------------------|-----------------------|---------------------------------------|---------|
| | | | | | | | | | |
| | | | | | | | | | |
| 1H UL | 30 | | | 3 | | | | | |
| | | | | 4 | | | | | |
| | | | | 4 | | | | | |
| 1I UL | 35 | | | 3 | | | | | |
| | | | | 4 | | | | | |
| | | | | 5 | | | | | |
| 1J UL | 40 | | | 3 | | | | | |
| | | | | 4 | | | | | |
| | | | | 4 | | | | | |
| 1K UL | 45 | | | 3 | | | | | |
| | | | | 4 | | | | | |
| | | | | 5 | | | | | |
| 1L UL | 50 | | | 3 | | | | | |
| | | | | 3 | | | | | |
| | | | | 5 | | | | | |
| 1M UL | 55 | | 55'0" End of Boring | 3 | | | | | |
| | | | | 5 | | | | | |
| | | | | 6 | | | | | |
| | 60 | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | 65 | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | 70 | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | 75 | | | | | | | | |
| | | | | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | Hole filled with Natural Soils from 0'0" to 55'0" | | | | |



PROJECT Soils Exploration

JOB NO. 64-8519

LOCATION Allen Park Clay Mine

SURFACE ELEV. 595.14

DATE 2-27-78

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|--|-------|--------|--|--|---------------|-----------------------|-----------------------|-------------------------------------|-----------|
| | 1 | | Firm moist sandy black TOPSOIL | | | | | | |
| 2A UL | 2 | | 1'6" | 3 | | | | | |
| | 3 | | | 5 | | | | | |
| | 4 | | | 6 | | | | | |
| 2B UL | 5 | | 3'6" | 3 | | | | | |
| | 6 | | | 4 | | | | | |
| | 7 | | | 3 | | | | | |
| 2C UL | 8 | | 6'0" | 3 | | | | | |
| | 9 | | | 3 | | | | | |
| | 10 | | | 4 | | | | | |
| 2D UL | 11 | | 9'0" | 4 | | | | | |
| | 12 | | | 5 | | | | | |
| | 13 | | | 6 | | | | | |
| | 14 | | 14'6" | 3 | | | | | |
| 2E UL | 15 | | | 4 | | | | | |
| | 16 | | | 3 | | | | | |
| | 17 | | 17'0" | | | | | | |
| | 18 | | | | | | | | |
| | 19 | | | | | | | | |
| 2F UL | 20 | | Firm moist silty blue CLAY and ROUGE MARKINGS | 2 | | | | | |
| | 21 | | | 3 | | | | | |
| | 22 | | | 4 | | | | | |
| | 23 | | | | | | | | |
| | 24 | | | | | | | | |
| 2G UL | 25 | | | 2 | | | | | |
| | | | | 3 | | | | | |
| | | | | 3 | | | | | |
| TYPE OF SAMPLE O. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | | REMARKS: Tip of Well Point Set @ 77'0" | | | | GROUND WATER OBSERVATIONS | |
| | | | | Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | | | G.W. ENCOUNTERED AT 3 FT. 6 INS. | |
| | | | | | | | | G.W. ENCOUNTERED AT 70 FT. 6 INS. | |
| | | | | | | | | G.W. AFTER COMPLETION 70 FT. 0 INS. | |
| | | | | | | | | G.W. AFTER HRS. FT. INS. | |
| | | | | | | | | G.W. VOLUMES HEAVY | |

SOIL DESCRIPTION

Penetration
Blows For 6"

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. |
|---------------|-------|--------|---|-----------------------------|------------|--------------------|
| 2H UL | 30 | | 27'0" Firm moist silty blue CLAY and ROUGE MARKINGS | 3 | | |
| 2I UL | 35 | | | 4 | | |
| 2J UL | 40 | | | 5 | | |
| 2K UL | 45 | | Stiff moist blue CLAY, with sand and pebbles | 3 | | |
| 2L UL | 50 | | | 4 | | |
| 2M UL | 55 | | | 4 | | |
| 2N UL | 60 | | 58'0" | 2 | | |
| 2O UL | 65 | | Firm moist blue CLAY, with sand and pebbles | 4 | | |
| 2P UL | 70 | | | 5 | | |
| 2Q UL | 75 | | 69'0" Stiff moist sandy blue CLAY | 3 | | |
| | | | 70'6" Very compact wet medium gray SAND | 4 | | |
| | | | 74'0" HARDPAN and layers of SAND | 6 | | |
| | | | | 10 | | |
| | | | | 33 | | |
| | | | | 89 | | |

TYPE OF SAMPLE
D. - DISTURBED
U.L. - UNDIST. LINER
S.T. - SHELBY TUBE
S.S. - SPLIT SPOON
R.C. - ROCK CORE
() - PENETROMETER

REMARKS:

Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals

PROJECT Soils Exploration

JOB NO. 64-8519

LOCATION Allen Park Clay Mine

SURFACE ELEV. 593.14 DATE 2-27-78

Allen Park, Michigan

[illegible]

DATE 2-22-78

SOIL DESCRIPTION

1'0"

Medium moist mixed sand and
bricks, FILL
Medium compact moist medium
brown SAND

4' 6"

Stiff moist silty variegated
CLAY

79'0"

Stiff moist silty oxidized
variegated CLAY

11,000

Stiff moist silty blue CLAY

17'0"

Soft moist silty blue CLAY

TYPE OF SAMPLE
D. - DISTURBED
U.L. - UNDIST. LINER
S.T. - SHELBY TUBE
S.S. - SPLIT SPOON
C. - ROCK CORE
) - PENETROMETER

REMARKS:

Standard Penetration Test — Driving 2" OD Sampler 1' With
140# Hammer Falling 30". Count Made At 6" intervals

GROUND WATER OBSERVATIONS

GROUND
G.W. ENCOUNTERED AT
G.W. ENCOUNTERED AT
G.W. AFTER COMPLETION
G.W. AFTER
G.W. VOLUMES

HRS.
NONE

INS.
INS.
INS.
INS.



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. _____

3

PROJECT Soils Exploration

JOB NO. 64-8519

LOCATION Allen Park Clay Mine

SURFACE ELEV. 598.49

DATE 2-22-78

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|--|-------|--------|--|--|---------------|-----------------------|-----------------------|-----------------------------|-----------|
| | | | Soft moist silty blue CLAY | | | | | | |
| 3H UL | 30 | | | 2 | | | | | |
| | | | | 2 | | | | | |
| | | | | 2 | | | | | |
| 3I UL | 35 | | | 2 | | | | | |
| | | | | 2 | | | | | |
| | | | | 3 | | | | | |
| 3J UL | 40 | | Firm moist blue CLAY, with sand and pebbles | 2 | | | | | |
| | | | | 3 | | | | | |
| | | | | 3 | | | | | |
| 3K UL | 45 | | | 2 | | | | | |
| | | | | 3 | | | | | |
| | | | | 4 | | | | | |
| 3L UL | 50 | | | 2 | | | | | |
| | | | | 3 | | | | | |
| | | | | 3½ | | | | | |
| 3M UL | 55 | | Stiff moist blue CLAY, with sand and pebbles End of Boring | 2 | | | | | |
| | | | | 4 | | | | | |
| | | | | 5 | | | | | |
| | 60 | | | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | Hole Filled with Natural Soils from 0'0" to 55'0" | | | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. 4

PROJECT Soils Exploration

JOB NO. 64-8519

LOCATION Allen Park Clay Mine

SURFACE ELEV. 595.07

DATE 2-23-78

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | str. % |
|---------------|-------|--------|---|-----------------------------|---------------|-----------------------|-----------------------|-----------------------------|-----------|
| | 1 | | Firm moist sandy black TOPSOIL | | | | | | |
| 4A | 2 | | Medium compact moist medium brown SAND | 3 | | | | | |
| UL | 3 | | | 4 | | | | | |
| | 3 | | | 3 | | | | | |
| | 4 | | | | | | | | |
| 4B | 5 | | Firm moist oxidized variegated silty CLAY | 1 | | | | | |
| UL | 6 | | | 2 | | | | | |
| | 7 | | | 3 | | | | | |
| 4C | 8 | | Firm moist silty blue CLAY | 2 | | | | | |
| UL | 9 | | | 2 | | | | | |
| | 10 | | | 3 | | | | | |
| 4D | 11 | | Soft moist silty blue CLAY | 2 | | | | | |
| UL | 12 | | | 2 | | | | | |
| | 13 | | | 2 | | | | | |
| | 14 | | | | | | | | |
| 4E | 15 | | Soft moist silty blue CLAY, with sand and pebbles, rouge markings | 1 | | | | | |
| UL | 16 | | | 1 1/2 | | | | | |
| | 17 | | | 2 | | | | | |
| | 18 | | | | | | | | |
| | 19 | | | | | | | | |
| 4F | 20 | | | 2 | | | | | |
| UL | 21 | | Firm moist blue CLAY, with sand and pebbles | 2 | | | | | |
| | 22 | | | 3 | | | | | |
| | 23 | | | | | | | | |
| | 24 | | | | | | | | |
| 4G | 25 | | | 2 | | | | | |
| UL | | | | 3 | | | | | |
| | | | | 3 | | | | | |

TYPE OF SAMPLE
D. - DISTURBED
U.L. - UNDIST. LINER
S.T. - SHELBY TUBE
S.S. - SPLIT SPOON
R.C. - ROCK CORE
() - PENETROMETER

REMARKS:

Standard Penetration Test — Driving 2" OD Sampler 1' With
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

| | | | | |
|-----------------------|-------|-----|---|------|
| G.W. ENCOUNTERED AT | 1 | FT. | 0 | INS. |
| G.W. ENCOUNTERED AT | 55 | FT. | 0 | INS. |
| G.W. AFTER COMPLETION | | FT. | | INS. |
| G.W. AFTER | HRS. | FT. | | INS. |
| G.W. VOLUMES | LIGHT | | | |

PROJECT Soils Exploration

JOB NO. 64-8519

LOCATION Allen Park Clay Mine

SURFACE ELEV. 595.07 DATE 2-23-78

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|---|-------|--------|--|--|---------------|-----------------------|-----------------------|-----------------------------|-----------|
| 4H UL | 30 | | | 2 2 3 | | | | | |
| 4I UL | 35 | | Firm moist blue CLAY, with sand and pebbles | 1 2 3 | | | | | |
| 4J UL | 40 | | | 1 2 3 | | | | | |
| 4K UL | 45 | | | 2 3 3 | | | | | |
| 4L UL | 50 | | | 2 3 4 | | | | | |
| 4M UL | 55 | | 52'0" Stiff moist blue CLAY and layers of wet SAND 55'0" End of Boring | 3 4 4 | | | | | |
| | 60 | | | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | | REMARKS: Hole filled with Natural Soils & Cement from 0'0" to 55'0" Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. _____

5

PROJECT Soils Exploration

JOB NO. 64-8519

LOCATION Allen Park Clay Mine

SURFACE ELEV. 595.68

DATE 2-25-78

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|---------------|-------|--------|--|-----------------------------|---------------|-----------------------|-----------------------|-----------------------------|-----------|
| | 1 | | Firm moist sandy black TOPSOIL | | | | | | |
| 5A UL | 2 | | Compact moist medium brown SAND | 4 | | | | | |
| | 3 | | Very compact moist medium brown SAND and CLAY | 9 | | | | | |
| | 4 | | Compact wet fine brown SAND | 8 | | | | | |
| 5B UL | 5 | | Stiff moist silty variegated CLAY | 3 | | | | | |
| | 6 | | | 4 | | | | | |
| 5C UL | 7 | | Firm moist silty variegated CLAY | 4 | | | | | |
| | 8 | | | 2 | | | | | |
| | 9 | | Firm moist silty blue CLAY | 3 | | | | | |
| 5D UL | 10 | | | 2 | | | | | |
| | 11 | | | 2 | | | | | |
| | 12 | | | 3 | | | | | |
| | 13 | | | | | | | | |
| | 14 | | | | | | | | |
| 5E UL | 15 | | | 2 | | | | | |
| | 16 | | | 2 | | | | | |
| | 17 | | | 2 | | | | | |
| | 18 | | Soft moist silty blue CLAY | | | | | | |
| | 19 | | | | | | | | |
| 5F UL | 20 | | | 2 | | | | | |
| | 21 | | | 1 | | | | | |
| | 22 | | | 2 | | | | | |
| | 23 | | | | | | | | |
| | 24 | | | | | | | | |
| 5G UL | 25 | | | 1 | | | | | |
| | | | | 1 | | | | | |
| | | | | 2 | | | | | |

TYPE OF SAMPLE
D. - DISTURBED
U.L. - UNDIST. LINER
S.T. - SHELBY TUBE
S.S. - SPLIT SPOON
R.C. - ROCK CORE
() - PENETROMETER

REMARKS:

Tip of Well Point Set
@ 79'0"

Standard Penetration Test — Driving 2" OD Sampler 1' With
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

| | | | | |
|-----------------------|-------|-----|---|------|
| G.W. ENCOUNTERED AT | 3 | FT. | 0 | INS. |
| G.W. ENCOUNTERED AT | 73 | FT. | 0 | INS. |
| G.W. AFTER COMPLETION | 25 | FT. | 0 | INS. |
| G.W. AFTER | HRS. | FT. | | INS. |
| G.W. VOLUMES | HEAVY | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. _____

5

PROJECT Soils Exploration

JOB NO. 64-8519

LOCATION Allen Park Clay Mine

SURFACE ELEV. 595.68

DATE 2-25-78

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural WL P.C.F. | Dry Den WL P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|---|-------|--------|---|---|---------------|----------------------|----------------------|-----------------------------|-----------|
| | | | Soft moist silty blue CLAY | | | | | | |
| | | | | | | | | | |
| 5H | 30 | | 29'0" | 2 | | | | | |
| UL | | | | 2 | | | | | |
| | | | | 3 | | | | | |
| | | | | | | | | | |
| 5I | 35 | | | 2 | | | | | |
| UL | | | Firm moist blue CLAY, with sand and pebbles | 3 | | | | | |
| | | | | 3 | | | | | |
| | | | | | | | | | |
| 5J | 40 | | | 2 | | | | | |
| UL | | | | 3 | | | | | |
| | | | | 3½ | | | | | |
| | | | | | | | | | |
| 5K | 45 | | | 2 | | | | | |
| UL | | | | 3 | | | | | |
| | | | | 4 | | | | | |
| | | | | | | | | | |
| 5L | 50 | | 49'0" | 3 | | | | | |
| UL | | | | 4 | | | | | |
| | | | | 4 | | | | | |
| | | | | | | | | | |
| 5M | 55 | | | 2 | | | | | |
| UL | | | | 4 | | | | | |
| | | | | 4 | | | | | |
| | | | | | | | | | |
| 5N | 60 | | Stiff moist blue CLAY, with sand and pebbles | 3 | | | | | |
| UL | | | | 4 | | | | | |
| | | | | 4 | | | | | |
| | | | | | | | | | |
| 5O | 65 | | | 3 | | | | | |
| UL | | | | 3 | | | | | |
| | | | | 5 | | | | | |
| | | | | | | | | | |
| 5P | 70 | | | 3 | | | | | |
| UL | | | | 3 | | | | | |
| | | | | 5 | | | | | |
| | | | | | | | | | |
| | | | 73'0" | | | | | | |
| 5Q | 75 | | Compact wet medium gray SAND | 4 | | | | | |
| UL | | | | 8 | | | | | |
| | | | | 8 | | | | | |
| TYPE OF SAMPLE O. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. 6

PROJECT Soils Exploration

JOB NO. 64-8519

LOCATION Allen Park Clay Mine

SURFACE ELEV. 595.03 DATE 3-2-78 Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|---|-------|--------|--|---|---------------|-----------------------|-----------------------|-----------------------------|-----------|
| | 1 | | Sandy TOPSOIL | | | | | | |
| | 2 | | | | | | | | |
| 6A UL | 3 | | | 6 | | | | | |
| | 4 | | | 7 | | | | | |
| | 5 | | | 7 | | | | | |
| 6B UL | 6 | | Stiff moist variegated CLAY, with sand and silt, some vegetation | | | | | | |
| | 7 | | | 3 | | | | | |
| | 8 | | | 5 | | | | | |
| | 9 | | | 5 | | | | | |
| 6C UL | 10 | | | 6 | | | | | |
| | 11 | | | 7 | | | | | |
| | 12 | | | 7 | | | | | |
| | 13 | | | | | | | | |
| 6D UL | 14 | | | 3 | | | | | |
| | 15 | | | 4 | | | | | |
| | 16 | | Soft moist blue CLAY, with sand | 4 | | | | | |
| | 17 | | | | | | | | |
| | 18 | | | | | | | | |
| | 19 | | | | | | | | |
| 6E UL | 20 | | | 2 | | | | | |
| | 21 | | | 2 | | | | | |
| | 22 | | | 2 | | | | | |
| | 23 | | | | | | | | |
| | 24 | | | | | | | | |
| 6F UL | 25 | | | 2 | | | | | |
| | | | | 2 | | | | | |
| | | | | 2 | | | | | |
| | | | | 2 | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | | | | |
| | | | | GROUND WATER OBSERVATIONS G.W. ENCOUNTERED AT FT. INS. G.W. ENCOUNTERED AT FT. INS. G.W. AFTER COMPLETION FT. INS. G.W. AFTER HRS. FT. INS. G.W. VOLUMES NONE | | | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. _____

7

PROJECT Soils Exploration

JOB NO. 64-8519

LOCATION Allen Park Clay Mine

SURFACE ELEV. 594.11

DATE 2-28-78

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural WL P.C.F. | Dry Den WL P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|---------------|-------|--------|---|-----------------------------|---------------|----------------------|----------------------|-----------------------------|-----------|
| | 1 | | 0'6" Firm moist sandy black TOPSOIL | | | | | | |
| 7A | 2 | | Firm moist silty variegated CLAY | 2 | | | | | |
| UL | 3 | | | 3 | | | | | |
| | 4 | | | 3 | | | | | |
| 7B | 5 | | 6'0" Soft moist silty variegated CLAY | 2 | | | | | |
| UL | 6 | | | 2 | | | | | |
| | 7 | | | 3 | | | | | |
| 7C | 8 | | 10'4" Firm moist silty blue CLAY | 2 | | | | | |
| UL | 9 | | | 2 | | | | | |
| | 10 | | | 2 | | | | | |
| 7D | 11 | | 17'0" Soft moist blue CLAY, with sand and pebbles, rouge markings | 3 | | | | | |
| UL | 12 | | | 3 | | | | | |
| | 13 | | | 4 | | | | | |
| | 14 | | | | | | | | |
| | 15 | | | | | | | | |
| | 16 | | | | | | | | |
| 7E | 17 | | | | | | | | |
| UL | 18 | | | | | | | | |
| | 19 | | | | | | | | |
| | 20 | | | | | | | | |
| | 21 | | | | | | | | |
| | 22 | | | | | | | | |
| | 23 | | | | | | | | |
| | 24 | | | | | | | | |
| | 25 | | | | | | | | |
| 7F | 26 | | | 2 | | | | | |
| UL | 27 | | | 2 | | | | | |
| | 28 | | | 2 | | | | | |
| | 29 | | | | | | | | |
| | 30 | | | | | | | | |
| | 31 | | | | | | | | |
| 7G | 32 | | | 1 | | | | | |
| UL | 33 | | | 2 | | | | | |
| | 34 | | | 2 | | | | | |

TYPE OF SAMPLE
D. - DISTURBED
U.L. - UNDIST. LINER
S.T. - SHELBY TUBE
S.S. - SPLIT SPOON
R.C. - ROCK CORE
() - PENETROMETER

REMARKS: Tip of Well Point Set @ 79'0"

Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

| | | | | |
|-----------------------|--------------|-----|---|------|
| G.W. ENCOUNTERED AT | 10 | FT. | 0 | INS. |
| G.W. ENCOUNTERED AT | 72 | FT. | 0 | INS. |
| G.W. AFTER COMPLETION | 72 | FT. | 0 | INS. |
| G.W. AFTER | HRS. | FT. | | INS. |
| G.W. VOLUMES | MEDIUM-HEAVY | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. _____

7

PROJECT Soils Exploration

JOB NO. 64-8519

LOCATION Allen Park Clay Mine

SURFACE ELEV. 594.11

DATE 2-28-78

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str % |
|--|-------|--|---|--------------------------|------------|--------------------|--------------------|--------------------------|-------|
| | | | Soft moist blue CLAY, with sand and pebbles, rouge markings | | | | | | |
| | | | 29'0" | | | | | | |
| 7H | 30 | | | 2 | | | | | |
| UL | | | | 3 | | | | | |
| | | | | 3 | | | | | |
| | | | | | | | | | |
| 7I | 35 | | Firm moist blue CLAY, with sand and pebbles | 2 | | | | | |
| UL | | | | 3 | | | | | |
| | | | | 4 | | | | | |
| | | | | | | | | | |
| 7J | 40 | | | 2 | | | | | |
| UL | | | | 2½ | | | | | |
| | | | | 3 | | | | | |
| | | | | | | | | | |
| 7K | 45 | | | 2 | | | | | |
| UL | | | 46'0" | 2 | | | | | |
| | | | | 3 | | | | | |
| | | | | | | | | | |
| 7L | 50 | | Stiff moist blue CLAY, with sand and pebbles | 3 | | | | | |
| UL | | | | 4 | | | | | |
| | | | | 5 | | | | | |
| | | | | | | | | | |
| 7M | 55 | | | 3 | | | | | |
| UL | | | | 4 | | | | | |
| | | | | 4 | | | | | |
| | | | 58'0" | | | | | | |
| 7N | 60 | | | 2 | | | | | |
| UL | | | Firm moist blue CLAY, with sand and pebbles | 3 | | | | | |
| | | | | 3 | | | | | |
| | | | | | | | | | |
| 7O | 65 | | | 2 | | | | | |
| UL | | | | 2 | | | | | |
| | | | | 3 | | | | | |
| | | | | | | | | | |
| 7P | 70 | | Stiff moist blue CLAY, with sand and pebbles | 3 | | | | | |
| UL | | | | 4 | | | | | |
| | | | 72'0" | 5 | | | | | |
| | | | | | | | | | |
| | | | Compact wet medium gray SAND | | | | | | |
| | | | 74'0" | | | | | | |
| 7Q | 75 | | Extremely stiff moist blue CLAY, with sand and pebbles | 18 | | | | | |
| UL | | | | 21 | | | | | |
| | | | | 24 | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | | | | | | |

PROJECT Soils Exploration

JOB NO. 64-8519

LOCATION Allen Park Clay Mine

SURFACE ELEV. 594.11

DATE 2-28-78

Allen Park, Michigan

[illegible]



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. 8

PROJECT Soils Exploration

JOB NO. 64-8519

LOCATION Allen Park Clay Mine

SURFACE ELEV. 593.91 DATE 2-28-78

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|---------------|-------|--------|---|-----------------------------|---------------|-----------------------|-----------------------|-----------------------------|-----------|
| | 1 | | 0'6" TOPSOIL | | | | | | |
| 8A | 2 | | | 2 | | | | | |
| UL | 3 | | Firm moist variegated CLAY, with sand and vegetation | 3 | | | | | |
| | 4 | | | 4 | | | | | |
| 8B | 5 | | | 3 | | | | | |
| UL | 6 | | 5'6" | 3 | | | | | |
| | 7 | | | 4 | | | | | |
| 8C | 8 | | | 4 | | | | | |
| UL | 9 | | | 5 | | | | | |
| | 10 | | Firm moist brown CLAY, with sand | 4 | | | | | |
| 8D | 11 | | | 5 | | | | | |
| UL | 12 | | | 5 | | | | | |
| | 13 | | 13'0" | | | | | | |
| | 14 | | | | | | | | |
| 8E | 15 | | | 2 | | | | | |
| UL | 16 | | | 2 | | | | | |
| | 17 | | | 2 | | | | | |
| | 18 | | | | | | | | |
| | 19 | | Soft moist blue CLAY, with sand and pebbles | | | | | | |
| 8F | 20 | | | 2 | | | | | |
| UL | 21 | | | 2 | | | | | |
| | 22 | | | 3 | | | | | |
| | 23 | | | | | | | | |
| | 24 | | | | | | | | |
| 8G | 25 | | | 2 | | | | | |
| UL | | | | 3 | | | | | |
| | | | | 3 | | | | | |

TYPE OF SAMPLE
D. - DISTURBED
U.L. - UNDIST. LINER
S.T. - SHELBY TUBE
S.S. - SPLIT SPOON
R.C. - ROCK CORE
() - PENETROMETER

REMARKS:

Standard Penetration Test — Driving 2" OD Sampler 1' With
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

| | | |
|-----------------------|------|------|
| G.W. ENCOUNTERED AT | FT. | INS. |
| G.W. ENCOUNTERED AT | FT. | INS. |
| G.W. AFTER COMPLETION | FT. | INS. |
| G.W. AFTER | HRS. | FT. |
| G.W. VOLUMES | NONE | |

PROJECT Soils Exploration

JOB NO. 64-8519

LOCATION Allen Park Clay Mine

SURFACE ELEV. 593.91 DATE 2-28-78

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|---|-------|--------|--|---|---------------|-----------------------|-----------------------|-----------------------------|-----------|
| 8H UL | 30 | | | 2 3 3 | | | | | |
| 8I UL | 35 | | Soft moist blue CLAY, with sand and pebbles | 2 3 4 | | | | | |
| 8J UL | 40 | | | 2 3 3 | | | | | |
| 8K UL | 45 | | | 2 3 4 | | | | | |
| 8L UL | 50 | | | 3 4 5 | | | | | |
| 8M UL | 55 | | 55'0" End of Boring | 4 5 5 | | | | | |
| | 60 | | | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | | REMARKS: Hole filled with Natural Soils from 0'0" to 55'0" | | | | | |
| Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | | | | | | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. 9

PROJECT Soils Exploration

JOB NO. 64-8519

LOCATION Allen Park Clay Mine

SURFACE ELEV. 593.73 DATE 3-1-78 Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Gr. % |
|---------------|-------|--------|---|-----------------------------|---------------|-----------------------|-----------------------|-----------------------------|----------|
| | 1 | | 0'9" Sandy TOPSOIL | | | | | | |
| 9A | 2 | | Very compact moist brown SAND, with some vegetation | 6 | | | | | |
| UL | | | | 8 | | | | | |
| | 3 | | | 11 | | | | | |
| | 4 | | 3'6" | | | | | | |
| 9B | | | Very compact wet brown SAND | 8 | | | | | |
| UL | 5 | | | 8 | | | | | |
| | 6 | | | 8 | | | | | |
| 9C | 7 | | 7'6" | 6 | | | | | |
| UL | | | | 7 | | | | | |
| | 8 | | | 8 | | | | | |
| | 9 | | | | | | | | |
| 9D | | | | 6 | | | | | |
| UL | 10 | | | 8 | | | | | |
| | 11 | | Stiff moist blue CLAY, with sand and streaks of sand | 10 | | | | | |
| | 12 | | | | | | | | |
| | 13 | | | | | | | | |
| | 14 | | | | | | | | |
| 9E | | | | 5 | | | | | |
| UL | 15 | | | 5 | | | | | |
| | 16 | | 17'0" | 5 | | | | | |
| | 17 | | | | | | | | |
| | 18 | | | | | | | | |
| | 19 | | Soft moist blue CLAY, with sand | 2 | | | | | |
| 9F | | | | 2 | | | | | |
| UL | 20 | | | 2 | | | | | |
| | 21 | | | | | | | | |
| | 22 | | | | | | | | |
| | 23 | | | | | | | | |
| | 24 | | | | | | | | |
| 9G | | | | 3 | | | | | |
| UL | 25 | | | 4 | | | | | |
| | | | | 4 | | | | | |

TYPE OF SAMPLE
D. - DISTURBED
U.L. - UNOIST. LINER
S.T. - SHELBY TUBE
S.S. - SPLIT SPOON
R.C. - ROCK CORE
() - PENETROMETER

REMARKS:

Standard Penetration Test — Driving 2" OD Sampler 1' With
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

| | | |
|-----------------------|------|------|
| G.W. ENCOUNTERED AT | FT. | INS. |
| G.W. ENCOUNTERED AT | FT. | INS. |
| G.W. AFTER COMPLETION | FT. | INS. |
| G.W. AFTER | HRS. | FT. |
| G.W. VOLUMES | NONE | |



PROJECT Soils Exploration

JOB NO. 64-8519

LOCATION Allen Park Clay Mine

SURFACE ELEV. 593.73 DATE 3-1-78

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|--|-------|--------|------------------------------------|--|---------------|-----------------------|-----------------------|-----------------------------|-----------|
| 9H UL | 30 | | Soft moist blue CLAY, with sand | 3 | | | | | |
| | | | | 4 | | | | | |
| | | | | 5 | | | | | |
| 9I UL | 35 | | | 3 | | | | | |
| | | | | 4 | | | | | |
| | | | | 5 | | | | | |
| 9J UL | 40 | | | 3 | | | | | |
| | | | | 4 | | | | | |
| | | | | 6 | | | | | |
| 9K UL | 45 | | | 3 | | | | | |
| | | | | 4 | | | | | |
| | | | | 5 | | | | | |
| 9L UL | 50 | | | 3 | | | | | |
| | | | | 4 | | | | | |
| | | | | 5 | | | | | |
| 9M UL | 55 | | 55'0" End of Boring | 3 | | | | | |
| | | | | 4 | | | | | |
| | | | | 5 | | | | | |
| | 60 | | | | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | | | | |
| | | | | Hole filled with Natural Soils from 0'0" to 55'0" | | | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. 10

PROJECT Soils Exploration

JOB NO. 64-8519

LOCATION Allen Park Clay Mine

SURFACE ELEV. 593.40 DATE 3-2-78

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|---------------|-------|--------|--|-----------------------------|---------------|-----------------------|-----------------------|-----------------------------|-----------|
| | 1 | | Firm moist sandy black TOPSOIL | | | | | | |
| 10A | 2 | | Compact moist medium brown SAND | 3 | | | | | |
| UL | | | | 4 | | | | | |
| | 3 | | | 5 | | | | | |
| | 4 | | | | | | | | |
| 10B | 5 | | Compact wet medium brown SAND | 3 | | | | | |
| UL | | | | 4 | | | | | |
| | 6 | | | 4 | | | | | |
| 10C | 7 | | Firm moist blue CLAY and SILT | 2 | | | | | |
| UL | | | | 3 | | | | | |
| | 8 | | | 3 | | | | | |
| | 9 | | | | | | | | |
| 10D | 10 | | Stiff moist blue CLAY and SILT | 3 | | | | | |
| UL | | | | 4 | | | | | |
| | 11 | | | 5 | | | | | |
| | 12 | | | | | | | | |
| | 13 | | | | | | | | |
| | 14 | | | | | | | | |
| 10E | 15 | | Firm moist blue CLAY, SILT and ROUGE MARKINGS | 3 | | | | | |
| UL | | | | 5 | | | | | |
| | 16 | | | 6 | | | | | |
| | 17 | | | | | | | | |
| | 18 | | | | | | | | |
| | 19 | | | | | | | | |
| 10F | 20 | | Firm moist blue CLAY, SILT and ROUGE MARKINGS | 2 | | | | | |
| UL | | | | 3 | | | | | |
| | 21 | | | 4 | | | | | |
| | 22 | | | | | | | | |
| | 23 | | | | | | | | |
| | 24 | | | | | | | | |
| 10G | 25 | | Firm moist blue CLAY, SILT and ROUGE MARKINGS | 2 | | | | | |
| UL | | | | 3 | | | | | |
| | | | | 3 | | | | | |

TYPE OF SAMPLE
D. - DISTURBED
U.L. - UNDIST. LINER
S.T. - SHELBY TUBE
S.S. - SPLIT SPOON
R.C. - ROCK CORE
() - PENETROMETER

REMARKS:

Tip of Well Point Set
@ 81'0"

Standard Penetration Test — Driving 2" OD Sampler 1' With
140# Hammer Falling 30"; Count Made At 6" Intervals

GROUND WATER OBSERVATIONS

| | | | | |
|-----------------------|-------|-----|---|------|
| G.W. ENCOUNTERED AT | 2 | FT. | 0 | INS. |
| G.W. ENCOUNTERED AT | 75 | FT. | 6 | INS. |
| G.W. AFTER COMPLETION | 1 | FT. | 0 | INS. |
| G.W. AFTER | HRS. | FT. | | INS. |
| G.W. VOLUMES | HEAVY | | | |



MICHIGAN TESTING ENGINEERS, INC.
CONSULTING ENGINEERS IN SOILS & FOUNDATIONS

LOG OF SOIL BORING NO. _____

10

PROJECT Soils Exploration

JOB NO. 64-8519

LOCATION Allen Park Clay Mine

SURFACE ELEV. 595.40 DATE 3-2-78

Allen Park, Michigan

| Sample & Type | Depth | Legend | SOIL DESCRIPTION | Penetration Blows For 6" | Moisture % | Natural Wt. P.C.F. | Dry Den Wt. P.C.F. | Unc. Comp. Strength PSF. | Str. % |
|---|-------|--------|---|---|---------------|-----------------------|-----------------------|-----------------------------|-----------|
| | | | Firm moist blue CLAY, SILT, and ROUGE MARKINGS | | | | | | |
| 10H UL | 30 | | 29'0" | 3 | | | | | |
| | | | Stiff moist blue CLAY, with sand and pebbles | 4 | | | | | |
| | | | | 4 | | | | | |
| 10I UL | 35 | | 34'0" | 2 | | | | | |
| | | | | 3 | | | | | |
| | | | | 3 | | | | | |
| 10J UL | 40 | | | 2 | | | | | |
| | | | Firm moist blue CLAY, with sand and pebbles | 3 | | | | | |
| | | | | 4 | | | | | |
| 10K UL | 45 | | | 2 | | | | | |
| | | | | 3 | | | | | |
| | | | | 3 | | | | | |
| 10L UL | 50 | | | 2 | | | | | |
| | | | 51'0" | 3 | | | | | |
| | | | | 4 | | | | | |
| 10M UL | 55 | | | 4 | | | | | |
| | | | Stiff moist blue CLAY, with sand and pebbles | 4 | | | | | |
| | | | | 5 | | | | | |
| 10N UL | 60 | | | 4 | | | | | |
| | | | | 5 | | | | | |
| | | | | 6 | | | | | |
| 10O UL | 65 | | 63'0" | 2 | | | | | |
| | | | | 3 | | | | | |
| | | | Firm moist blue CLAY, with sand and pebbles | 4 | | | | | |
| 10P UL | 70 | | | 2 | | | | | |
| | | | | 3 | | | | | |
| | | | | 4 | | | | | |
| 10Q UL | 75 | | 75'6" | 2 | | | | | |
| | | | Very compact wet medium brown SAND | 3 | | | | | |
| | | | | 3 | | | | | |
| TYPE OF SAMPLE D. - DISTURBED U.L. - UNDIST. LINER S.T. - SHELBY TUBE S.S. - SPLIT SPOON R.C. - ROCK CORE () - PENETROMETER | | | | REMARKS: Standard Penetration Test — Driving 2" OD Sampler 1' With 140# Hammer Falling 30"; Count Made At 6" Intervals | | | | | |

PROJECT Soils Exploration

JOB NO. 64-8519

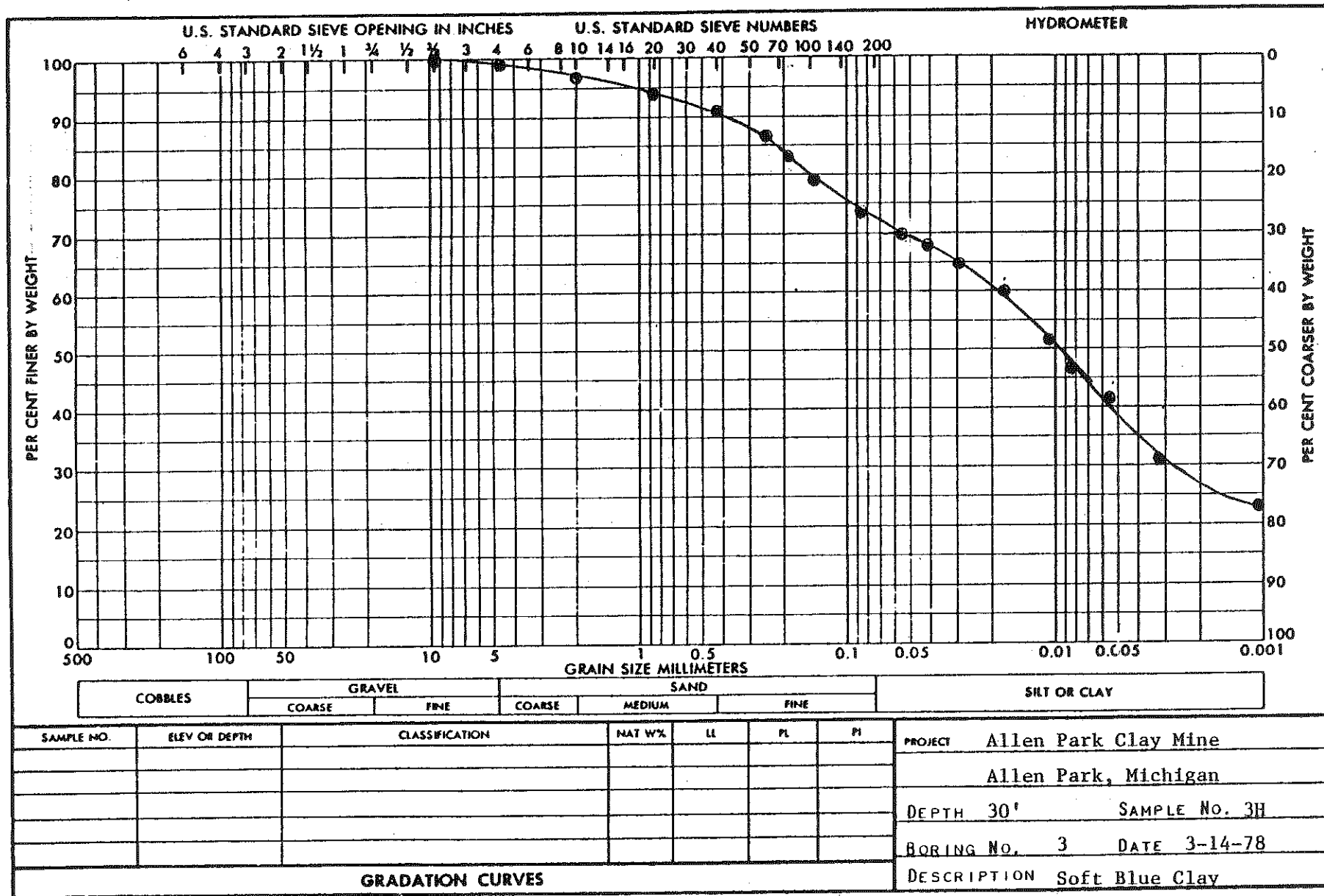
LOCATION Allen Park Clay Mine

SURFACE ELEV. 595.40

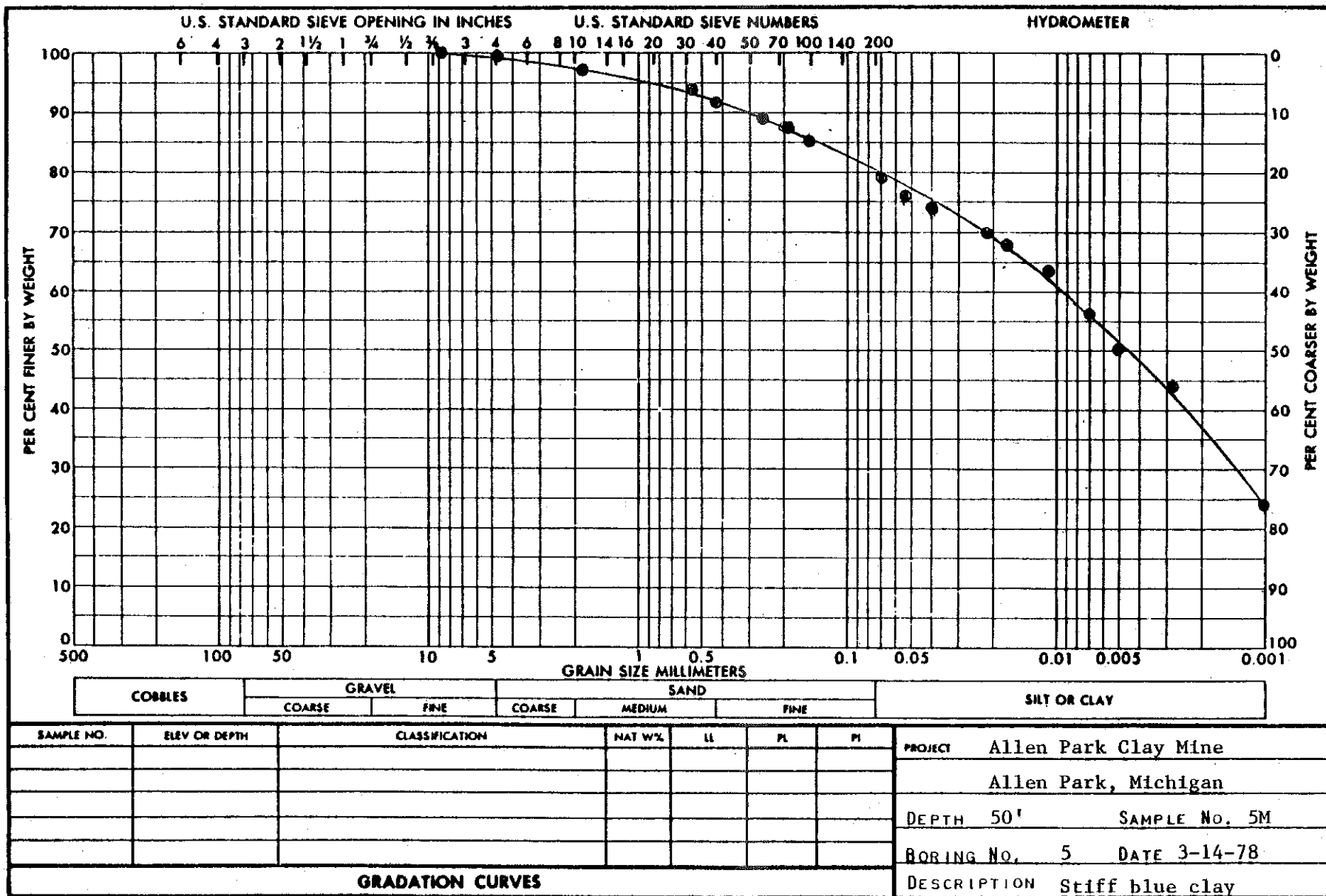
DATE 3-2-78

Allen Park, Michigan

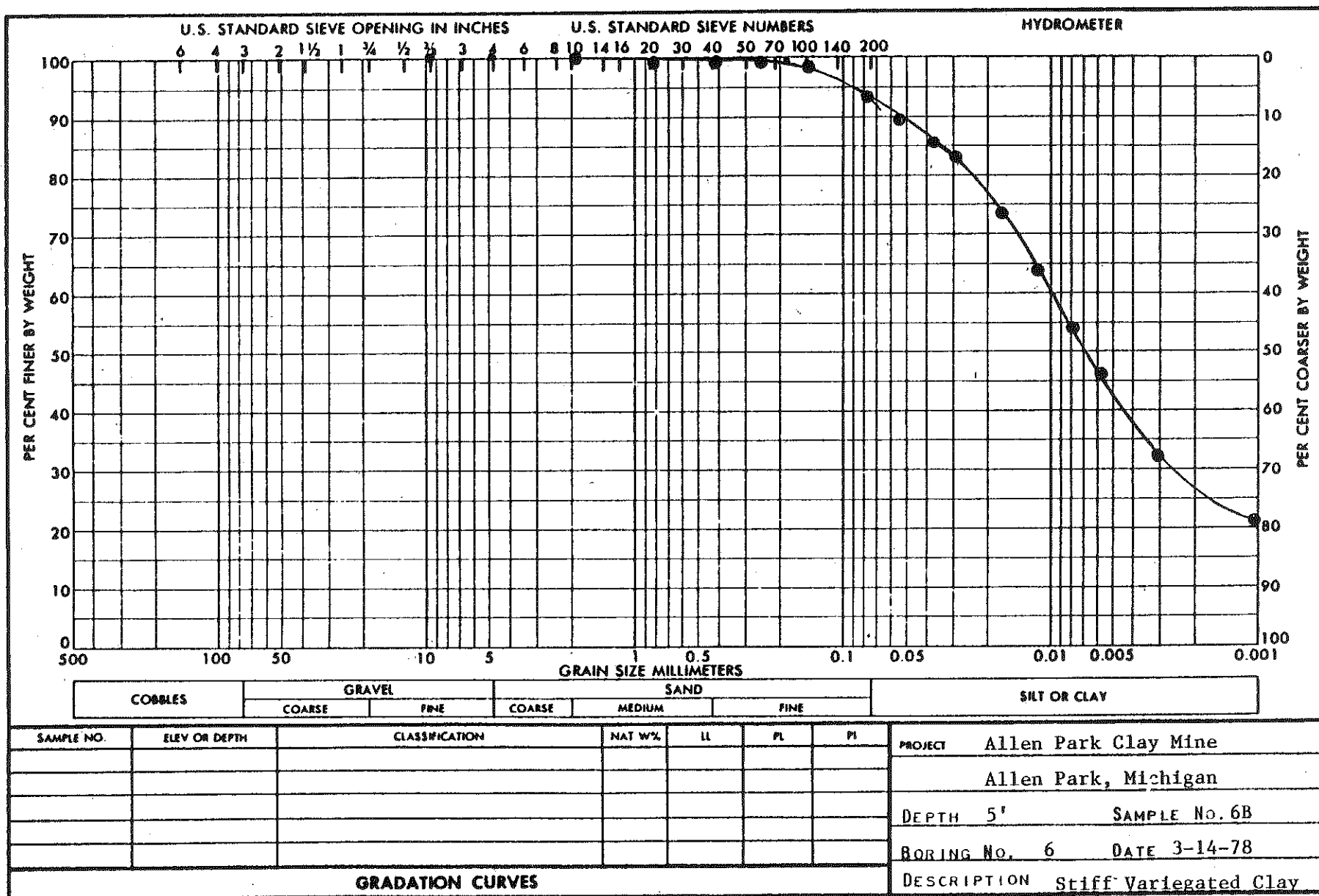
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JOB NO. 64-8519



JOB NO. 64-8519



JOB NO. 64-8519

APPENDIX G

SOIL BORING FROM VETERANS HOSPITAL
LOCATED AT OUTER DRIVE AND M-39

